A Naval Safety Center Publication

approach

FEBRUARY 1971 THE NAVAL AVIATION SAFETY REVIEW

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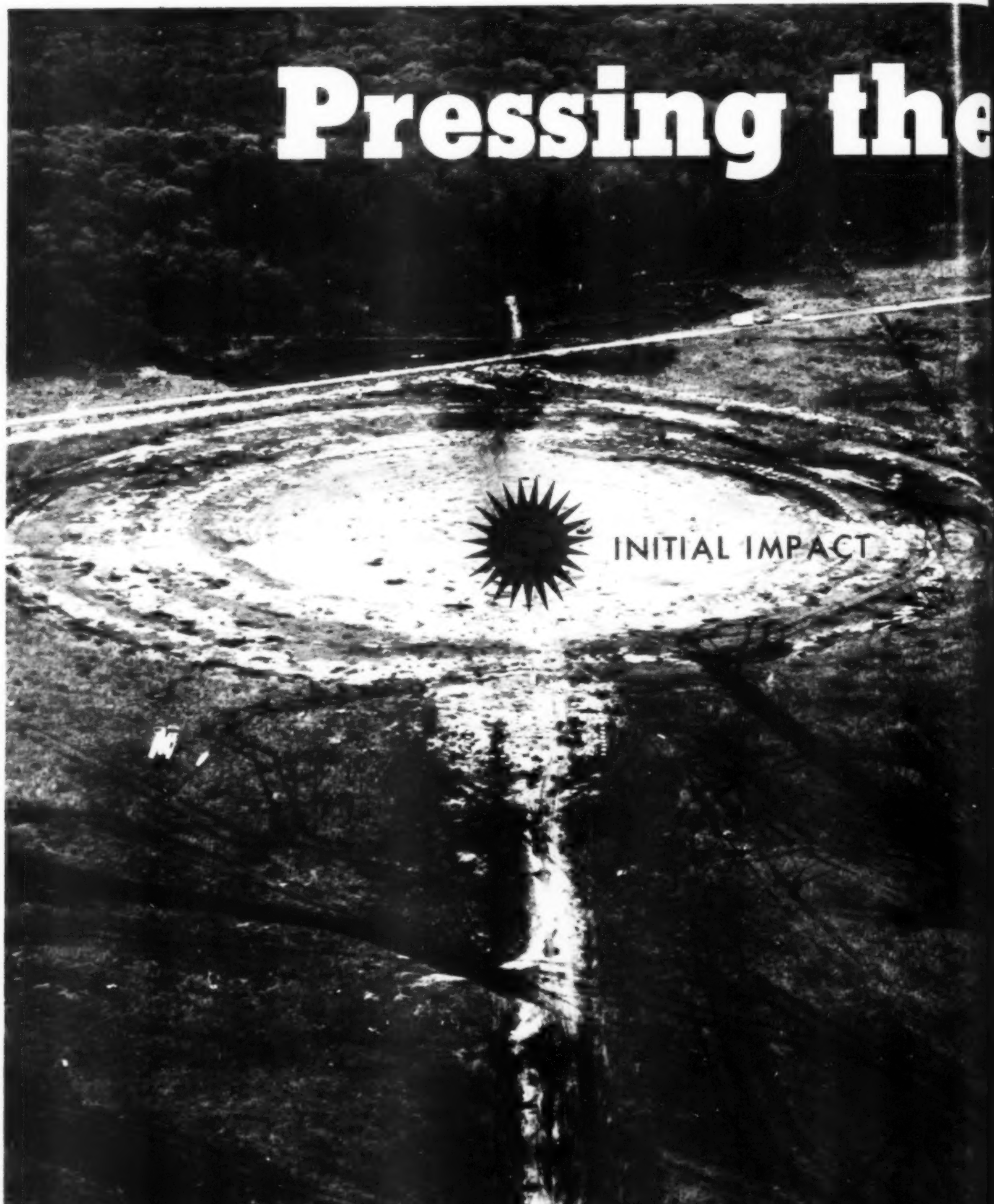

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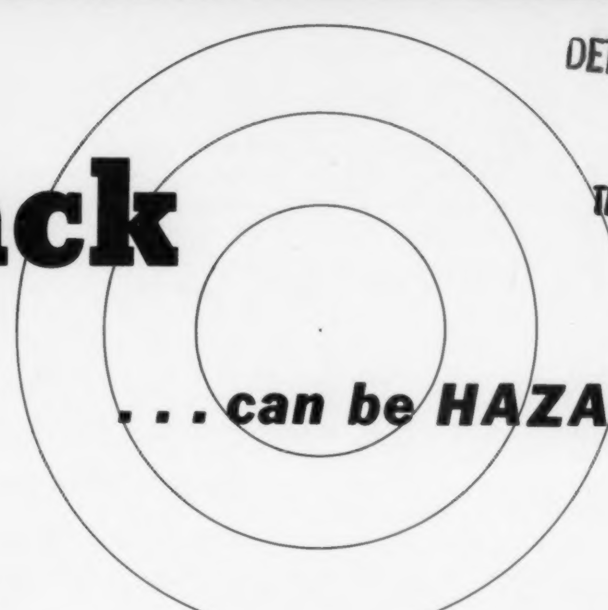

. . . can be HAZARDOUS!

"I MUST have had target fixation because I saw at least six of my rockets impact before I started my pullout." These are the words of an A-4E pilot whose aircraft was damaged by shrapnel during a close air support mission. During the investigation, it was determined that the pilot had experienced difficulty in establishing a firing run because of clouds in the target area. As a result, when the pilot finally did get established in a 20-degree rocket run, he was late in opening fire. He had planned to fire at 2000 feet AGL but did not actually commence until he reached 1200 feet AGL. He then fired four pairs of rockets and became so engrossed with the problem that he watched at least six of his rockets impact before starting a pullout. The result was a very low pullout and considerable shrapnel damage to the aircraft. *It could have been worse.*

The term "target fixation" may suggest a hypnotic trance-like condition brought on by looking at some feature of the target, e.g., its perfect symmetry. However, accident reports indicate that, in reality, it is often simply a matter of concentrating too much attention on getting in a favorable firing position to the neglect of a most important part of the bombing/strafing problem – a safe and timely recovery. There are several possible reasons for this. It could be a deliberate violation of minimum safe release altitudes in order to score a better hit or, more likely, it could be entirely unintentional. For example, if a poor dive entry is made, the time available for tracking is usually insufficient. This may cause the pilot to unintentionally descend below the minimum safe altitude while he is engrossed in solving the tracking problem.

Regardless of the reasons, delays in initiating recoveries from ordnance runs are known to be the cause of a substantial number of accidents annually. In addition, it is the suspected cause factor in a number of "undetermined" accidents. One such undetermined accident involved a flight of four A-4C aircraft which took off for a 10-degree practice napalm bombing mission. Each aircraft was loaded with 12 Mk 76 practice bombs.

The 10-degree napalm delivery, as practiced in this squadron, is entered from a racetrack pattern. The downwind leg is flown at 4000 feet AGL and 275 knots. A descending turn is made so as to intercept the run-in line, outside the 30,000 foot marker, in level flight at 450 to 500 knots, at 100 feet AGL. At 15,000 feet from the target, a 4G pull-up is initiated until the aircraft attitude is 30 degrees nose up. The G is then relaxed, the aircraft is rolled inverted and the nose is pulled down slightly below the target. (Maximum altitude attained in the climb is about 3000 feet.) The aircraft is then rolled upright in a 10-degree dive. Tracking commences and at 450 feet AGL (525 feet on the A-4C pressure altimeter, to compensate for altimeter lag), the bomb is released and a 4G recovery is initiated. Minimum altitude after bomb release is usually no less than 200 feet AGL.

On this flight, there was a 2600-foot broken cloud layer in the area so the flight used an alternate delivery pattern, as briefed by the flight leader, i.e., a racetrack pattern just below the clouds at 300 kias with a pushover to a 10-degree dive from level flight.

After completing six or seven runs, the flight leader observed that the cloud layer had dissipated and advised

the No. 3 aircraft to enter his next dive with the pop-up, roll-ahead maneuver. The No. 3 man complied and reported no difficulties in performing the maneuver. The flight leader then advised the entire flight to conduct the pop-up, roll-ahead entry for the remainder of the flight.

On the No. 4 man's 13th run, he was heard to make normal reports when turning in, at the 30,000-foot marker, at the 24,000-foot marker and when pulling up. The target spotters observed the No. 4 man's last bomb impact and shortly thereafter, saw the aircraft fly into the water and disintegrate. Impact was at 12 o'clock about 300 feet from the target. No ejection attempt was observed.

The cause of this accident could not be absolutely determined. No material failures or malfunctions were indicated. The pilot had completed 12 dive bombing runs prior to the mishap and had made no transmission concerning any aircraft malfunction. On his final dive, he made all normal radio transmissions and was observed by the flight leader to successfully execute the pop-up, roll-ahead dive entry maneuver. In addition, a bomb was observed to impact the target prior to the crash, indicating that the aircraft was controllable, at least until after the point of bomb release.

None of the witnesses interviewed (target personnel) had observed the aircraft continuously from dive entry until water impact. However, at least two witnesses offered the opinion that the dive was steeper than the usual 10-degree dive.

The pilot was limited in flying experience, having accumulated a total of about 350 flight hours, with only 50 in A-4 series aircraft. Nevertheless, it was determined by a review of his flight training jacket and interviews with fellow pilots, that the pilot involved was an aggressive aviator who was rated as being well above average. He was not known to have any particular weaknesses or apprehensions concerning flying.

The board noted that the pilot had executed 11 successful dives and 1 abort and that his bomb hits were considered to be average. The board speculated that the pilot could have realized that the 13th dive was to be the final run and this could have increased the pilot's inherent aggressiveness to the point where he pressed the attack beyond the point of safety. As a hypothetical analysis, the board considered the possibility that the pilot could have inadvertently entered a dive somewhat steeper than the normal 10 degrees, experienced difficulty with pipper tracking and reduced power to compensate for the high airspeed and/or steep dive angle. Then, in an attempt to score well with his last bomb, pressed the dive in and released at such a low altitude that he was unable to recover from the dive. The pilot's relative inexperience in both flying and dive-bombing with the A-4 aircraft may have precluded him from recognizing an in extremis situation until it was too late to effect a recovery.

The cause factors in this accident will never be known with certainty. The speculation that it resulted from the pilot pressing the attack beyond safe limits is just that – speculation. Nevertheless, the possibility is too real to be ignored.

An F-8H accident gives a good indication of the manner in which several factors can combine to result in a late pullout and collision with the ground. In this case, the pilot was No. 4 man in a four-plane flight which took off to practice 45-degree bombing (with Mk 76 bombs) and 20-degree strafing.

The flight leader briefed the flight covering mil leads, altitudes and safety of flight with respect to target fixation. The flight launched and executed a normal rendezvous following individual takeoffs and departures. The flight then proceeded to the target and executed a left break into the strafing pattern.

The pilot made three successful strafing passes prior to the fourth pass on which the crash occurred. His first pass was non-firing, as briefed. The second pass was also non-firing in compliance with instructions from the target observers. He then fired on the third and fourth passes.

On the fourth pass the aircraft was observed to initiate a dive recovery at such a low altitude as to preclude a successful recovery. The aft section of the aircraft contacted the desert floor approximately 535 feet beyond the target. The aircraft is estimated to have been in a wings-level, nose-up attitude as it skidded for about 200 feet along the sand. The aircraft apparently then became airborne again and contacted the ground about 1200 feet from the target and shortly thereafter broke up in a catastrophic explosion.

The pilot apparently initiated an ejection which took place almost simultaneously with complete destruction of the aircraft. It is the opinion of the board that the pilot, upon feeling the initial impact, reached for the face curtain and initiated the ejection. The pilot suffered major injuries and the aircraft was destroyed.

A salient point uncovered during the investigation of the accident was the stated desire of the pilot to "fire out." The flight had been briefed to make four strafing runs. The pilot's first two runs were non-firing. This left only two firing runs prior to leaving the strafing pattern. If the pilot was consciously trying to fire all of his ammunition it would have required a longer than normal burst on each of these two remaining runs. The pilot, in fact, stated that he began to fire higher than normal (at 1500 feet instead of 1000 feet) in order to allow for a

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Photos showing shrapnel damage as a result of late pullout from rocket attack.

longer burst enabling him to fire out. However, the investigators determined that because of altimeter lag, an incorrect altimeter setting and the probable failure of the pilot to take the 100-foot elevation of the target into consideration, the pilot was probably 470 feet lower than he thought. This would naturally lead to a late pullout and would be compounded by any tendency on the part of the pilot to keep firing in an effort to empty his guns.

How can accidents such as these be prevented? There is no easy answer but there are some precautions which can be observed with good effect:

- First, plan your delivery carefully. There are many types of ordnance runs but not all of them will produce equally satisfying results. The type of delivery selected will depend upon the type ordnance employed and the expected defenses associated with the target. Any one of several deliveries may be suitable in a given situation; however, the pilot must be intimately familiar with the speeds, altitudes and G-loads involved in every part of the run – from entry until recovery is completed.

A knowledge of altitude required to effect a recovery after ordnance release is paramount, but the method used to determine the specified release/recovery altitude is equally important. On high angle runs, with attendant high release altitudes, the pressure altimeter will usually be the primary method of determining the release/recovery point, however, depending on the capability of the system, a radar altimeter can often be used with good effect as a cross-check. In minimum altitude bombing, a reliable radar altimeter will become increasingly important but the pressure altimeter will still be a basic reference in most cases. There is one very important point, however, in minimum altitude bombing/strafing: never place blind reliance upon altimeters, tone warnings, etc. Rather, use all available instruments for guidance in determining the drop point but strive to develop a seaman's eye which will enable you to visually recognize the lowest point at which a safe pullout can be accomplished. Other important points to consider are:

(1) Altimeter error. Know all there is to know about altimeter lag, position error, etc., in the aircraft you fly.

(2) Use an accurate altimeter setting. This is particularly important in minimum altitude deliveries. If an accurate setting cannot be obtained, use a fudge factor. An outdated altimeter setting can easily introduce errors on the order of 200-300 feet either up or *down!*

(3) Take into consideration the elevation of the target. This factor can easily be overlooked in making runs on targets of opportunity near sea level. Remember that several hundred feet of elevation can spell the difference between disaster and a safe recovery.

- Beware of uneven terrain, particularly upslopes along the recovery course.

- Excessively steep dive angles have been implicated in more than one accident – and many low pullouts. When using established target facilities, insure that target personnel report dive angles and low pullouts to the pilots concerned when they have the capability to do so. In addition, low pullouts should be indicated on the copies of scoring records furnished to the squadrons concerned.

- Make full use of all instruments available during night bombing. Insure targets are well lighted whenever possible but recognize that disorientation is a real hazard during night deliveries, even under the best of conditions. Inasmuch as safe night deliveries will depend upon instruments to a greater extent than day deliveries, increase release altitudes sufficiently to allow for a safe recovery under the worst conditions that may be encountered. Note particularly that pinpoint lights surrounding a target at night can be a hazard because they can easily be confused with stars on a clear night under the right conditions.

- Finally, and perhaps most important, use care to make a good entry (roll-in). Accurate ordnance deliveries require precise control of airspeed, dive angle, altitude, etc., at the moment of release and a careless or incorrect entry can needlessly complicate the problem. It is true that one factor can often be adjusted to compensate for another, e.g., less speed to compensate for a steep dive angle. However, these adjustments require extra attention by the pilot and a pilot who is already busy performing other tasks associated with the run can easily become overloaded to the point where he fails to give proper attention to the all-important recovery.

The ability to accurately deliver ordnance on a target is the hallmark of a good fighter/attack pilot. C.O.s and other aviation commanders recognize this and prescribe training cycles which provide individual pilots with ample opportunity to practice their profession.

Ordnance delivery is usually looked on as an interesting and enjoyable aspect of flying. For one thing, a pilot gets to put his aircraft to some measurable use. The flying itself is exhilarating because it involves rapid changes in headings, altitudes and attitudes. In addition, considerable competition often springs up among pilots and squadrons. This is fine; it is an important factor in honing the rough edges and adds zest to the job, but pilots should never become so concerned with getting hits that they unnecessarily endanger themselves or their aircraft.

Put your ordnance on target but *never* overlook preparation for making a safe recovery.

A Fractured Fable

By LT Norman E. Lane, MSC, USN

ONCE UPON a time in a forest there lived a tiger. He was a very fine tiger, indeed. His coat was rich and silky, and his great muscles rippled as he padded along through the forest. As is often the case with tigers, he was very brave and fearless and wasn't afraid of anything.

In this same forest lived a pussycat. He was an ordinary sort of pussycat and he did ordinary-sort-of-pussycat things. Of course, he wasn't as big and strong as the tiger and he had to watch carefully for all the dangers of the forest so he could stay out of trouble. The tiger found the pussycat's caution very humorous and always made fun of him for avoiding situations and places where trouble might be.

"I suppose," the tiger sneered, "that when one is little and weak like you, he has to look out for dangers. But *I'm* a tiger and tigers are very brave and fearless and not afraid of anything."

Like many of the animals in this rather unusual forest (whoever heard of a tiger and a pussycat living in a forest anyway?), the tiger kept his own herd of livestock. He had a cow and a goat and a horse and a donkey, all very fine animals. One spring he decided to move to the other side of the big river that ran through the forest. The heavy rains had made the river very deep and very fast.

"Come along!" the tiger said to the pussycat. "Let's swim across the river."

"Not I," replied the pussycat, "I'll wait till the water goes down and then I'll cross."

"Pussycat!" the tiger roared, and with that he jumped into the river, leading the livestock across. Needless to say the water tumbled them and tossed them and swept them down the river. Finally the tiger got to the other side and gathered up his livestock. After a little while he found his cow and his goat and his horse but his donkey was never seen again.

Moral: Even a tiger can lose his . . . donkey!

Short Snorts

To take a great weight off your mind, try discarding your halo.
Ace L.

Oh Chute

DURING a routine training flight the weather in the vicinity of the carrier deteriorated to the point where a divert for all recovering aircraft was ordered. The aircraft departed for the nearest airfield which was 70 miles away. Upon arrival the lead aircraft, an F-4, executed a tacan approach, after which a normal landing was accomplished. Upon touchdown, the throttles were retarded to IDLE and the drag chute handle was activated. The chute did not deploy and the aircraft began to hydroplane and swerve slightly from side to side. The pilot then decided to engage the BAK-9(B) arresting gear located 1500 feet from the end of the 8000-foot runway. The hook was lowered and was fully down prior to the attempted arrestment but it failed to engage the gear. The aircraft entered the runway overrun at approximately 15 knots, on centerline, and blew the left main gear tire upon engaging the MA-1A modified jet barrier. The *Phantom* sustained minor damage to the starboard trailing edge flap, port wing tank nose, nose gear door and the port trailing edge flap.

The investigation revealed that all procedures were properly performed by the pilot during this incident. He elected initially not to make an arrested landing due to the number of aircraft still airborne, many of them low state. At the time the aircraft arrived at the divert airfield the weather was reported VFR with 1000 feet scattered, 1500 feet scattered, 2500 feet broken and seven miles visibility. The RCR (runway condition reading) was reported 16WR (WR standing for wet runway). This is considered far from ideal for high performance jet aircraft. Presumably with light rain falling the RCR could even have been less at the time of landing than that reported, thus affording the pilot little or no hope of effecting a normal landing. The drag chute did not deploy because no chute was installed. Maintenance personnel removed it for minor repair and failed to reinstall it prior to this flight. It is the opinion of the ASO that the unsuccessful BAK-9(B) engagement was due to a combination of three factors; the fishtail swerving of the aircraft, a definite runway crown and possible inadvertent braking by the pilot at the moment of contact.

The C.O. in his endorsement to this incident made the following comments: "The oversight on the part of maintenance for not having a drag chute installed has been corrected. The poor braking action by high performance jet aircraft on wet or icy surfaces is well known. Pilots landing prior to this incident had reported extremely slippery conditions. Considering all circumstances against the pilot, I believe that he displayed excellent airmanship in maintaining control of his aircraft as well as he did during the critical rollout phase."

Temp Sense

(Adapted from material by LCDR R. H. Ittner)

THE LONG life and operational reliability of the modern aircraft gas turbine engine is dependent upon many things, e.g., design, materials used, operational environment, type maintenance performed and flight technique, just to cite a few applicable categories. However, flight technique is the only variable category controllable by the pilot which can be applied in such a manner as to make a positive contribution toward engine longevity and reliability. Pilots should be knowledgeable about which maneuvers and cockpit procedures tend to induce a rise in exhaust gas temperatures which may exceed specified operating

limits. Temperature limitations may be exceeded unless exhaust gas temperatures are conscientiously monitored and corrective action taken at the first indication of overtemp.

Overtemp conditions, whether momentary or for a sustained period of time, create stresses in hot section components which are accumulative in nature because they cause metal creep and other deformities – conditions which contribute to hot section failures. On every engine is a fuel control having as one of its designed features the capability to maintain exhaust gases within certain specified and safe temperature ranges, *under normal operating conditions.* However, this capability can be nullified by internal malfunctions of the fuel control or by the operator not conforming strictly to MIMs and NATOPS approved procedures. A fuel control *cannot compensate for* material malfunctions or those induced by unauthorized flight techniques. Any action which prevents a fuel control from performing as designed, usually allows internal engine loads and temperatures to rise above design specifications unless immediate corrective reaction is taken by the operator. Any metal creep or other deformities due to excessive internal loads or temperatures reduces the strength of the components and may lead to hot section failures, premature engine removals or even aircraft mishaps.

The person actually in control of an engine, whether he be pilot or maintenance man, should strive to develop a subconscious awareness of proper "Temp Sense" which will alert him to react positively to excessive temperatures, especially during start and under extreme operating conditions. Operating an engine within specified temperatures, RPM and engine pressure ratios should become the operator's instinctive technique. Specific operating instructions published in the MIMs and NATOPS manuals should be adhered to judiciously in order to prevent overtemping an engine. Just because an engine doesn't melt away or show some other indications of deterioration is no basis for assuming that the engine has not suffered some damage whenever overtemp time limits have been exceeded. Every incident must be noted and recorded for proper engine condition evaluation.

To aid the operator and the mechanic in determining if an engine should be expected to provide long reliable service, engine manufacturers and certain electronic companies are busy developing various types of airborne engine condition monitoring systems which will be capable of monitoring multiple engine parameters which are known to affect engine life and operations.

Until the time that these new systems become available and are installed on every aircraft engine, every operator should develop his own "Temp Sense" as a means of extending his own life and the life of his engine.

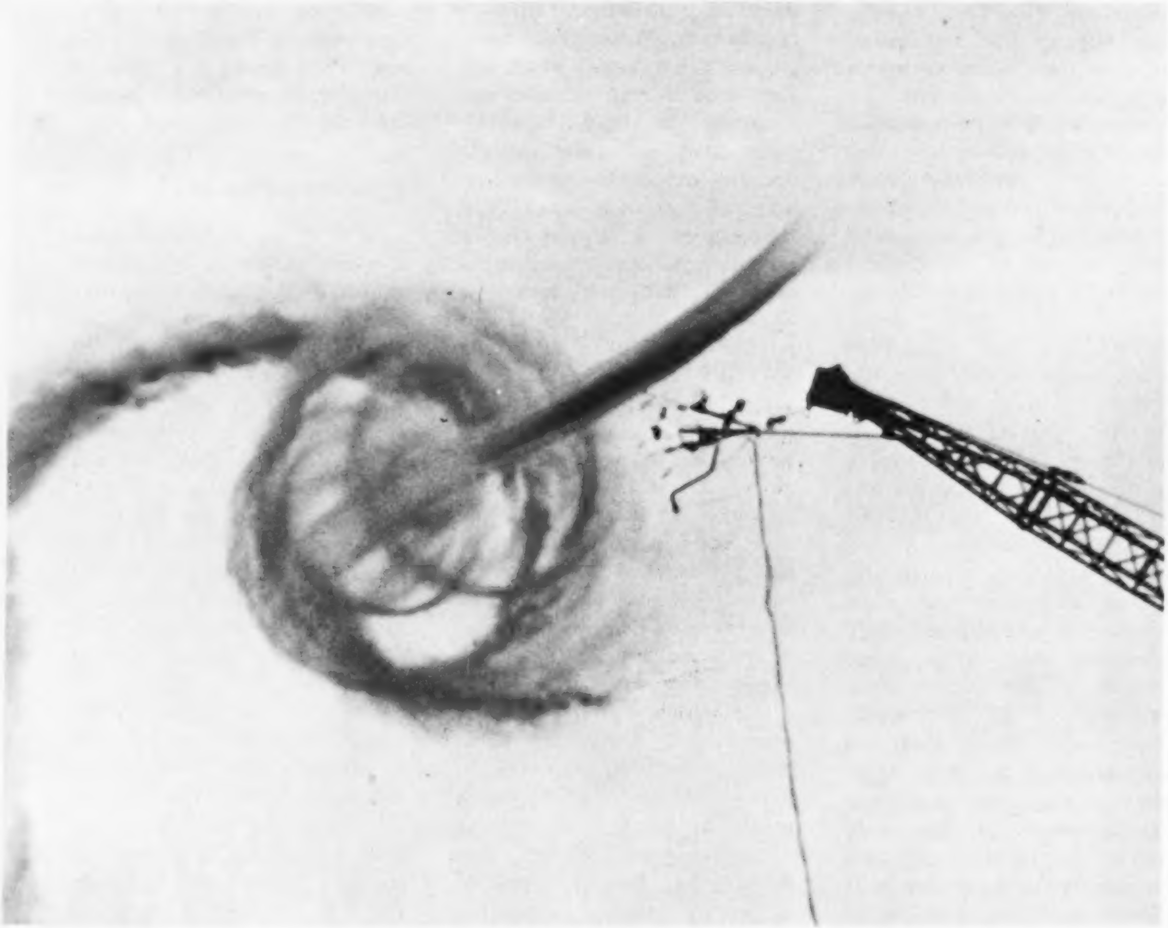
'Yessir, not only do I feel better since I quit smoking, but my grammar has improved tremendously.'

Something To . . .

AN S-2E was launched at 0215 in a rain shower for a scheduled night ASW flight. Immediately after launch the pilot noticed his airspeed indicator showing only 20 knots. Visibility was less than one-fourth of a mile in rain showers. He set his power at 45 inches MAP and 2500 rpm and climbed for altitude. The airspeed indicator gradually increased to 85 knots until the pilot reached 3500 feet. At this time the pilot realized the pitot covers were still installed and despite efforts to burn them off with pitot heat ON he was unsuccessful. He was instructed to remain VFR until daylight at which time he would be recovered. Later he received a "charlie" and made an uneventful landing. The cause of the incident was the failure of the pilot to conduct a proper and complete preflight prior to launch. His C.O. commented that this incident was avoidable and resulted from unprofessional performance by both plane captain and plane commander and further stated that if conditions are such that a pilot feels obliged to cut corners on a preflight one wonders how the plane captains must feel when they are out in the weather a much longer time than the flight crew. Personal comfort is a large price to pay for a few minutes of terror or a complete dunking.

. . . Think About

Wake turbulence has been implicated in a significant number of Navy aircraft accidents during recent years, particularly during the landing phase. An appreciation of the hazards of this phenomenon is vital to aviation safety, so read on . . .



TRAILING VORTICES or Wake Turbulence

FOR MANY YEARS the turbulence generated by aircraft in flight was attributed to "propwash." Pilots, in making maneuvers such as a steep 360-degree turn, would occasionally get caught in their own "propwash." The "propwash" behind other aircraft caused some pretty rough rides, unplanned waveoffs *and* a considerable number of accidents. In later years, the phenomenon of "propwash" has become better understood and is now classified in two categories – "thrust stream turbulence" and "wingtip vortices."

Thrust stream turbulence is caused by the high velocity air from the propeller blades of a prop aircraft or from the jet exhaust of a jet aircraft. Thrust stream turbulence is of primary concern during ground operations. It should not be a hazard to aircraft in flight except possibly in close formation, in the case of takeoff or landing in the vicinity of an aircraft making a ground runup, or in the case of helicopters operating at very low altitudes. For further reading on the hazards of thrust stream turbulence, refer to the following APPROACH articles:

- "C-5A Exhaust Velocity" on page 18 of the Oct 1970 issue.
- "The Big Blow" on page 20 and "Beware Jet/Prop Blasts" on page 32 of the Sept 1970 issue.

Wingtip Vortices, on the other hand, are generated during flight and cause the turbulence which is commonly referred to as "wake turbulence."

Vortices

A vortex is a highly organized rotational mass of disturbed air with high energy created by the wing of an aircraft as it produces lift. An aircraft creates two such vortices with rotational air movement. As a lift-producing airfoil passes through the air it leaves a continuous sheet of unstable air behind its trailing edge. Due to spillage of air about the wingtips, the air rolls into two distinct vortices, one trailing behind each wingtip. The rollup process is normally complete at a distance equal to about two to four times the wingspan of the aircraft (or rotor span in the case of a helicopter) – about 200 to 600 feet behind the aircraft. If visible, formation of the vortex cores would appear approximately as shown in Fig. 1. Vortices generated by the rotors of helicopters are shed and trail along the track behind the aircraft in the same manner as those generated by fixed-wing aircraft and have the same effect upon other aircraft.

Vortex Intensity

When an airfoil passes through a mass of air and creates lift, energy proportional to the weight being lifted is transmitted to the mass of air. Generally, the greater the lift the greater the energy transmitted to the air mass in the form of rotational flow. This rotational energy is directly related to the weight, wingspan and speed of the aircraft. The heavier and slower the aircraft, the greater the intensity of the air circulation in the vortex cores. Thus, it can be seen that vortices created by any given aircraft will have maximum rotational velocities during takeoff and landing at or near maximum gross weights.

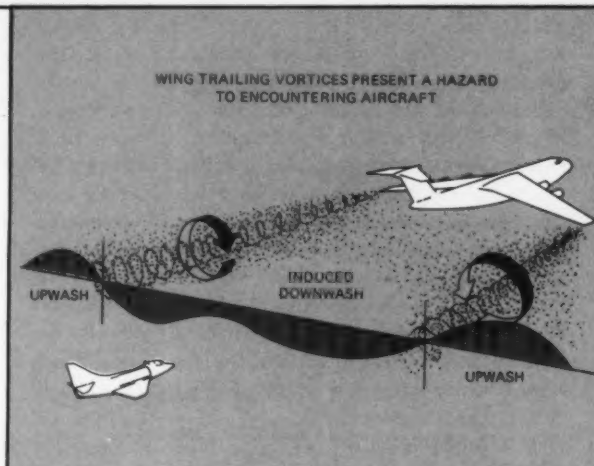


Fig. 1

Vortex Dangers

The force of the air in trailing vortices can well exceed the aileron control capability or climb rate of some light aircraft. The air in a vortex can produce roll rates in aircraft with short wingspans up to 80 degrees per second, which is about twice the roll rate capability of some light aircraft when using full aileron deflection. In addition, an aircraft directly between the center of the vortices formed by a heavy jet transport can experience a downward flow of about 1500 feet per minute. A light aircraft with a climb capability of 1000 to 1200 feet per minute can go in only one direction – down. Trapped in such a position, a light plane pilot who alters his course could get caught by the roll forces or a combination of downward and roll forces. These forces can be sufficient to cause light aircraft to do one or more complete rolls and/or force them into the ground. Various reports of light aircraft being damaged or destroyed confirm that wake vortices are indeed a considerable hazard.

Fortunately, most Navy aircraft are relatively heavy and most of them are capable of high rates of roll and climb. However, this does not exempt them from the

hazards of wake turbulence. For one thing, the capability to climb or otherwise maneuver is greatly reduced at the slow speeds used in the landing pattern. A review of Navy accidents and incidents between 1965 and the present involving wake turbulence shows that a significant number of aircraft have been damaged or destroyed as a result of wake turbulence encountered during final approach. Typically, just before touchdown a wing drops and contact is made with the runway while the aircraft is in a wing-down attitude. In these cases the upset occurs at such a low altitude that the pilot has no time to take corrective action. The result may range from a bent wingtip or a collapsed landing gear to total destruction of the aircraft.

Most other cases of damage to Navy aircraft as a result of wake turbulence have occurred during maneuvering between aircraft in the same flight. In several cases, an aircraft maneuvered across the wake of another aircraft while maintaining a high G-loading. Typically, the vortex causes the G-loading to increase instantaneously to a figure in excess of the maximum allowable G. There were no substantial structural failures because of this during the period 1965 to present and most of the aircraft involved suffered only minor or limited damage as a result of these encounters. Nevertheless, the potential for structural failure certainly exists. Moreover, in one case an A-7 passed into the wake turbulence of a TA-4F during tactical maneuvers, entered an accelerated stall and went into a spin. The pilot ejected and the aircraft was destroyed.

Except for one case where an F-4 sustained limited damage during touchdown following the takeoff of a P-3 aircraft, none of the accidents or incidents reported to the NAVSAFECEN during the period 1965 to the present involved heavy transport type aircraft. In most cases, they involved tactical or training aircraft. However, it is obvious that the potential for trouble is greater when following a large, heavy-laden transport type aircraft than it is when following smaller aircraft. Naval aviators should plan their flight operations accordingly.

Vortex Location

According to a Boeing Aircraft Corp. report a significant determination obtained from recent tests was that the wake levels off below the generating aircraft. It was found that the wake moves down behind the generating aircraft as expected, but levels off at approximately 700 feet below the airplane. The wake was never found to be more than 900 feet below the flight path.

Although vortices are normally invisible, recent tests have shown that engine exhaust from many jet aircraft and contrails are entrained in the vortex system and in certain meterological conditions provide a persistent visual clue to the probable location of hazardous turbulence. When visible, vortices may readily be avoided; otherwise, the best way of avoiding the vortices is to know where they are most likely to be encountered and act accordingly. Since vortices are not formed until lift is produced they will not be generated by an aircraft taking off until just before liftoff – at the point where rotation is made. Vortices cease to be generated by a landing aircraft when its wing ceases to provide lift – when it has actually landed. However, remember that a large aircraft could have taken off and be out of sight or landed and be on the ramp and the vortices could still be present near the runway. Another factor to remember is the vertical and lateral movements of vortices. Figure 2 shows an example of

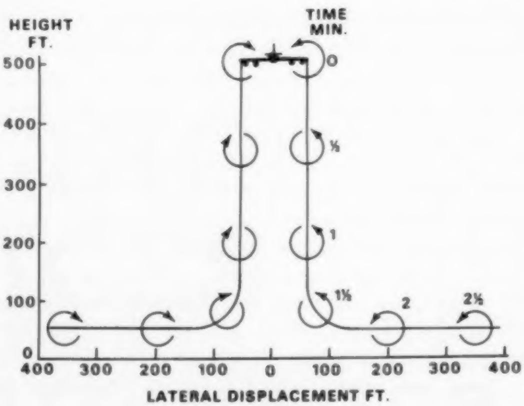


Fig. 2

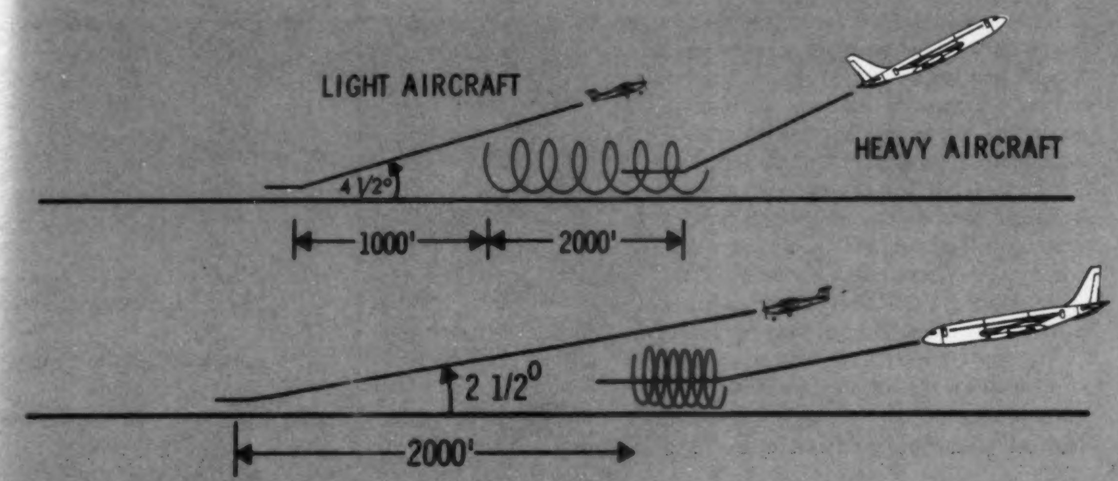


Diagram for light aircraft showing suggested flight path for avoiding vortices during takeoff and landing.
(For high performance aircraft with a requirement for long takeoff and landing distances the correct procedure is to take adequate interval.)

both in a no-wind condition. Vortices generated more than 400 or 500 feet above the surface will drop nearly vertically in a no-wind condition until reaching a height equal to approximately one-half the wingspan of the generating aircraft. At that point they start to curve outward and spread laterally away from the track of the aircraft. There is one other thing that must be remembered, that is – both the vertical and lateral movement of the vortices will be affected by and move with the encompassing air mass. A crosswind will displace the vortices from the vertical in their downward travel and affect the lateral rate of travel. A crosswind component of approximately four to six knots, depending upon the lateral rate of vortex travel, is sufficient to cause one core to remain laterally stationary over a line on the surface while the opposite vortex will travel at its own lateral rate plus that of the effective crosswind.

Suggested Pilot Action

Unfortunately, the best advice is not always the most practical. In the case of vortex hazard avoidance, to insure 100 percent success would require pilots, particularly those flying relatively small aircraft, to refrain from operating in areas where they might encounter wake turbulence. It would produce the desired result but would not be practical. So what can you as the pilot do?

It is not practical to establish an inflexible set of rules because of the infinite number of circumstances which can exist. The best general rule to remember is that *when it is necessary to operate behind another aircraft, wake turbulence can best be avoided by remaining above the flight path of that aircraft.* If this is not practical, remain at least 1000 feet below the flight path. Remember also, that large aircraft operating at heavy gross weights and slow speeds produce vortices with the greatest rotational velocities. Always allow adequate interval during landings and takeoffs behind any aircraft and avoid wake turbulence altogether, if possible.

As a final word, when the tower controller advises you, "Caution, wake turbulence," he is following his procedures and warning you that it may exist because of an aircraft that recently made a takeoff or landing. When you receive such an advisory, don't hesitate to request further information if you believe it will assist you in analyzing the situation and determining the course of action which you wish to take. Remember, even though a clearance for takeoff or landing has been issued, if you believe it safer to wait, use a different runway, or in some other way alter your intended operation, ask the controller for a revised clearance. Sometimes, air traffic clearances include use of the word "immediate." For example, "Cleared for immediate takeoff." In such cases, the word is used for purposes of air traffic separation. The clearance may be refused if you believe another course of action would be better suited to your intended operation. The controller's primary job is to aid in the prevention of collision between aircraft. However, he will assist you in any way he can while accomplishing his job.

Adapted from FAA Advisory Circular 90-23A and NASA Data

REFLECTIONS

So, Huey pilot! You are going to Nam, eh? The land of contrasts! Hot, swampy and muggy in the south; cool, mountainous and dry up in I Corps. Enough difference to keep all helicopter pilots on their toes. If the weather and terrain alone do not provide enough opposites consider also that max gross operations, night and instrument flying, heavy ordnance loads and formation flying are routine. Quite a contrast from Training Command operations. However, the excellent training you have already completed has prepared you well for the operational arena. When you return with a log book totaling between 1-2000 hours you will indeed be a combat veteran. The time between your arrival and departure in country will enable you to learn more about yourself, your helicopter and flight operations than you ever believed possible. Hear then a story and some flight tips. It's by one who has been there, and concerns a typical flight; routine in nature except it became filled with danger. Happily it was a flight which ended safely.

By LT Henry E. Freas

THERE were only a few days remaining before the pilot was to become a combat veteran rather than just a combat pilot. He was FTL (fire team leader) when he and his crew were scrambled to assist a small Army unit in contact with the enemy late one afternoon – not an uncommon mission during "slow periods." After a quick brief the crew manned their aircraft. The home-away-from-home for this crew was aboard a YRBM which, for good reason, is not noted for sumptious quarters nor for acres of flight deck space. The YRBM, at anchor, presented a nearly direct tailwind for takeoff and the OOD asked the pilot if he wanted the ship turned on the anchor. The pilot replied that he did not want to wait the 20 or 30 minutes that would be required to maneuver the YRBM and told the OOD he would twist on deck. (Under hot scramble conditions this maneuver would take much less time.) If he was careful there would be enough space. The initial attempt to execute a turn on deck met with rapid RPM decay and a less-than-smooth landing – on the original heading. The two gunners in the crew deplaned, each with a doorbox of ammo which gave the pilot an extra 400 pounds of lifting capability (one full percent of power). With the reduced weight the pilot successfully completed the next attempt at a 180.

The gunners climbed back aboard but while waiting for them the pilot noticed the bow jack indicate a 90-degree crosswind. Good grief! The YRBM was also turning. The pilot briefly exchanged unpleasantries with the conning officer and lifted into a hover for a power check – SOP with most hot shot gunship pilots. He had only one and a half percent power reserve and squadron policy dictated a three percent reserve for shipboard takeoffs. Nevertheless, *they* needed him and he was bound and determined to go. The pilot backed up a few feet and decided to make a short run intending to turn into the wind as soon as he became airborne and had cleared the ship's antennae. This was not an uncommon practice except that usually a few rockets were offloaded to gain a couple of hundred pounds. In this instance *nothing* was offloaded.

The pilot checked the bow jack once more to be sure the wind was still on his beam and started his takeoff. As he became airborne the wind shifted giving him a direct tailwind again. The heavy Huey began to settle and the pilot noticed he was losing turns before he had cleared the deck edge but he was committed and it was too late to stop. He knew he had to clear the deck edge with his tail rotor and also clear other "junk" (barges and boats) alongside. He knew he would have a reasonable chance if he could stay airborne long enough to level off in ground effect over the river until he could get translational lift. He later said, "All I could do was lower the nose to keep the tail rotor clear of the deck and pray that a thousand pieces of shrapnel from a shattered tail rotor would not tear people apart." As the pilot half flew, half flopped (with only minimum control) through the air he miraculously did not hook the toes of his skids in the safety net frame nor did his tail rotor hit the deck edge. Once the helo was over the side, the left door gunner jettisoned his rocket pod and doorbox of ammo to lighten the heavy helicopter. The pilot still believes to this day that his gunner's quick reaction saved the aircraft and crew. He also said, "It's peculiar what thoughts run through your mind in times of stress. Here I was fighting for our very lives and yet I was mad at myself for taking off without that extra two percent power reserve; I was furious with the OOD for swinging the YRBM and I was livid with rage at Fate for the wind shift."

Out over the river the last chance materialized. The pilot slowly got his RPM back, picked up translational lift and climbed out. Later, he had to endure considerable needling by his trail ship pilot when the leader had expended all of his ordnance and the wingman still had half a load to place on target. The wingman had been smart! He had departed the YRBM with a reduced load, flown to a nearby airstrip and taken on a full ordnance load before joining the FTL.

The pilot summed up the flight later when he said, "If we had not survived, the accident would have been classified as 100 percent pilot error because of failure to follow prescribed procedures. No circumstances are so severe as to warrant taking shortcuts or unduly subjecting an aircraft and crew (to say nothing of ship's company and others) to unnecessary hazards – even under hot scramble conditions." In this case if the original fire team had not launched successfully the delay in launching an alternate fire team would have taken much longer than the relatively short delay in taking off under better, safer conditions. ◄

Night Post-Launch Accidents

I AM a Lieutenant with four and one-half years in the Navy as a pilot, one Southeast Asia cruise under my belt and 1017 hours in my logbook. The incident I am reporting occurred during a predeployment shakedown cruise off the coast of California. I was turned up in my trusty A-7E awaiting my turn on the catapult. The night was very hazy and no horizon was visible. To make matters worse, I was beginning to pick up the "duty cold" racing through the squadron at the time. As I went streaking down the catapult track I knew immediately that I was going to be the victim of a beautiful case of vertigo. Once airborne, I struggled to keep my scan moving rapidly enough to fight what my sensations were telling me. The transition to gear and flaps up was completed with some difficulty. Soon I noticed that I was approaching a point five miles ahead of the ship and was required to turn to intercept the seven-mile arc. Just as I rolled into a bank, for some reason, I noticed the radar altimeter descending through 100 feet! I immediately leveled my wings and began a climb to convert the 380 knots airspeed I had into some altitude.

This can and most assuredly has happened to many, many pilots and a good solution for prevention is difficult to pin down. Perhaps, as has been suggested, squadron procedures set up pertaining to gear up passing a certain altitude, flaps up passing a higher altitude, etc., is a partial solution. Also, a mandatory radio call to ship's controller passing a certain altitude outbound may help alleviate the problem even though it may add to the radio chatter. In any case, all

concerned should devote more attention to the safety hazards associated with this critical area in carrier aviation.

Night Launch Mouse

Your Anymouse report focuses attention on a problem which is by all means real. During the last year there have been several cases where A-4/A-7 aircraft flew into the water shortly after being catapulted from a carrier at night. The aircraft involved in these accidents were not recovered and the exact cause factors have not been determined. However, as a result of such accidents, a conference of NAVSAFECEN, NAVAIRTESTCEN and NAVAIRSYSCOM representatives was convened at the NAVAIRTESTCEN on 22 October 1970 to discuss the problem. NAVAIRTESTCEN message 022052Z of November 1970 takes note of this conference and discusses several possible primary and contributing cause factors in A-4/A-7 night postlaunch accidents, as well as possible solutions.

According to this message, a likely primary cause factor is pilot distraction coupled with airplane characteristics during flap retraction. Normal postlaunch procedures are to establish a positive rate of climb, maintain constant pitch attitude and retract gear and flaps. Retraction of flaps while maintaining constant attitude results in reduced wing lift and attendant reduction in rate of climb. Under certain ambient temperature/gross weight/launch airspeed conditions, a negative rate of climb can result and altitude loss can be significant even though attitude remains constant.

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. These reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

REPORT AN INCIDENT, PREVENT AN ACCIDENT

Therefore, if flap retraction is not accompanied by retrimming or aft stick, increased lift deficiency and altitude loss result.

A-4/A-7 excess thrust characteristics at heavy gross weights/high temperatures further aggravate the above situation. Limited available longitudinal acceleration prevents rapid recovery of lift deficiency during flap retraction. This characteristic also creates a tendency for early flap retraction in order to improve acceleration/climb rate.

Based on the above, a hypothetical fly-into-the-water accident could evolve as follows: Launch at operational gross weight under IFR conditions; positive climb, recommended attitude established; gear retracted; flap retraction initiated. Simultaneously with initiation of flap retraction, distraction occurs. Scan pattern breaks down and reliance on gyro leads to false indication of "situation-normal." Reduced climb rate or descent results. Failure to re-trim/apply aft stick increases descent. If distraction is of sufficient duration, impact with water in wings level/nose-high attitude results.

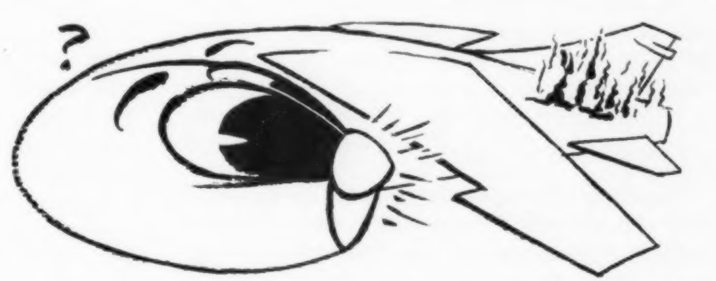
To reduce the potentiality of the above situation, NAVAIRTESTCEN made the following recommendations to NAVAIRSYSCOM:

- *Conduct all launches with partial flap settings, where feasible, to increase excess thrust/longitudinal acceleration and reduce lift deficiency during retraction. Recommend all launches at or above the following gross weights be conducted with listed flap settings if conditions permit. Wind over deck penalties for partial flap launches are minimal (four knots for A-7, five knots for A-4) considering improved excess thrust characteristics.*

Airplane	*Gross Weight*	*Flap Setting*
A-4 series	*20,000*	*Half*
A-7B/E (TF30-P-8)	*30,000*	*25 degrees*
A-7E (TF-41)	*32,000*	*25 degrees*

- *Carriers/squadrons minimize requirements for unnecessary pilot tasks during the critical phase following launch. Examples include nonessential radio transmissions, requirement to turn on rotating beacon, inclination to engage stab/control augmentation or other nonessential systems. Discussion with fleet A-7 operators also revealed peculiar distractions characteristic of the A-7, i.e., frequent illumination of master caution light due to low oxygen pressure signal during launch and frequent illumination of engine hot light under operational ambient temperature conditions. Recommend consideration be given to relocating oxygen warning light from caution panel to advisory panel. Engine hot light problem frequently stems from engine trim on the upper allowable limit of the trim band: no solution for this distraction is apparent.*
- *Establish minimum flap retraction altitude. Recommend 1000 feet for retraction if possible; 500 feet as absolute minimum. Recommend use minimum retraction airspeeds specified in current NATOPS in conjunction with minimum altitude.*
- *Revise launch procedure sections of A-4/A-7 NATOPS to emphasize necessity of retrimming/applying aft stick in conjunction with flap retraction. Also recommend revision to emphasize necessity of increasing attitude during flap transition to maintain established rate of climb (attitude change will minimize lift deficiency during transition). Continuing emphasis should be placed on the necessity for pilot to maintain strict vigilance during this critical phase of flight.*

The above recommendations are under consideration by NAVAIRSYSCOM and appropriate aviation commanders. If these recommendations are approved, it is expected that they will be reflected in changes to aircraft launching bulletins and aircraft NATOPS manuals. Pending final action on these recommendations, individual pilots should avoid becoming distracted during the critical period immediately after launch, defer completion of unnecessary tasks until a safe altitude has been reached and, in particular, take care to maintain a positive rate of climb during the transition from flaps down to flaps up flight by cross-checking the ADI with the vertical speed indicator, altimeter, radar altimeter and angle-of-attack indicator. ◄



Vertigo

and Visual Override

VERTIGO continues to be a problem in naval aviation. Most recent Naval Safety Center data covering calendar year 1969 indicate that in approximately eight percent of all major aircraft accidents, vertigo and disorientation were indicated by the medical officer as contributing to the accident. These figures do not include the myriad of near-accident vertigo episodes, most of which are probably unreported.

For simplicity and better understanding, the widely used and widely abused term "vertigo" should be broken down to:

1. True vertigo.
2. Dizziness.
3. Spatial disorientation.

True vertigo (as the term is used in the medical sense) is mostly disease-caused and is important medically. Briefly it is total dysequilibrium with nausea, vomiting and nystagmus (jerking motions of the eyes caused by excessive stimulation of the inner ear). True vertigo is disabling. In aviation, true vertigo is seen in the Coriolis effect which is simultaneous stimulation of the semicircular canals by multiple angular accelerations. This is why aviators are cautioned to restrict head movement during accelerations and turns.

Dizziness is a broad category of disorders which do not involve real dysequilibrium but rather a woozy, unsteady or slightly unbalanced feeling. Many are related to illness, usually minor, but certainly all of the dizziness states are related to *altered physiology.* Typical examples in aviation are:

- Mild hypoglycemia, as from not eating breakfast or from skipping lunch before your hop.
- The effects of flying with a "cold," (includes "pressure vertigo" as well as the effects of the virus).[1]
- Mild dehydration, as in hangover.
- Hypoxia, fatigue states, drug usage.

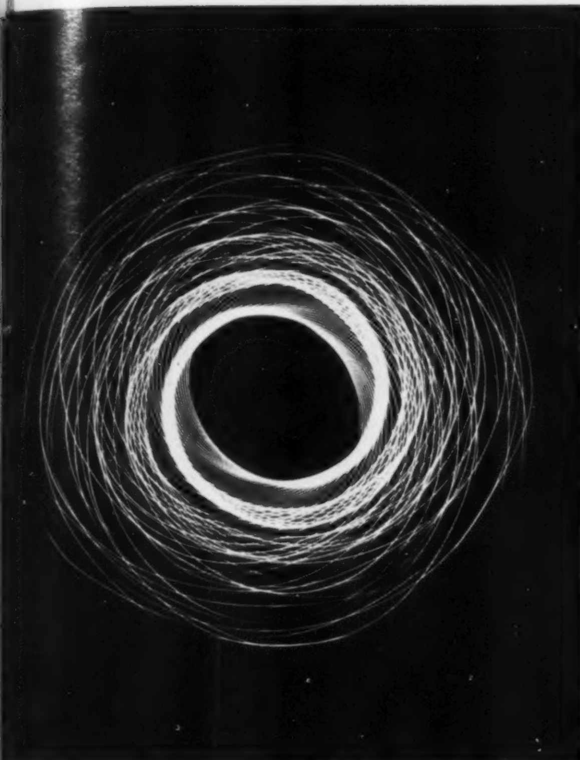
Suffice it to say that most of these can be prevented. If your physiology has been altered, don't fly.

Spatial disorientation is the most important of the three forms of vertigo in aviation and is the main topic of this article. It results from *normal physiology!* So – let's talk only about healthy aviators who don't fly with colds, who eat breakfast and who wear oxygen masks and preoxygenate. Spatial disorientation is very likely to be experienced by these people.

The normal person spends his early years experimenting with the world. Children run, jump, climb and generally do everything possible to explore the environment. You, yourself, may recall hyperventilating, spinning around or performing other techniques of inducing dizziness or vertigo just for the experiment. The adult human presumably has mastered the understanding of his normal sensory inputs. But then, he decides to fly and "experiment" with a new environment. What happens? All the normal sensory inputs continue as before but now sometimes they differ from reality and here is the real danger in aviation.

We call these normal but false inputs *illusions.* By the way of background, there are three basic systems involved in maintaining balance: the eyes, the inner ears and the proprioceptive system. (The latter involves sensory inputs from muscles, tendons, joints and skin – the "seat of the pants" inputs.) Inputs from all

[1]"Pressure vertigo" is caused by excessive stimulation of the inner ear due to abnormal aeration of the middle ear cavity through the Eustachian tube.



By LCDR J. A. White, MC, USNR-R
Resident in Otolaryngology
Tulane University, New Orleans, La.

three systems are interpreted and integrated by the brain in a complex arrangement beyond the scope of this discussion. By long training all the inputs usually coincide. But enter the aviator! When the inputs don't agree or when they are illusory, disorientation occurs.

There are four broad categories of illusions:

1. Visual.
2. Inner ear.
3. Proprioceptive.
4. Central.

Visual illusions are very important but will not be discussed here. Central illusions are largely in the realm of psychology, psychiatry and neurology and so will also be omitted from this discussion. But the normal sensory inputs from the proprioceptive system and the inner ears are the real culprits of spatial disorientation in aviation.

Any experienced aviator knows "vertigo," i.e., spatial disorientation, is most common in IFR situations. The reason is quite simple. Humans are *visually oriented.* We read and watch movies and TV. We prefer to see a pretty girl rather than just hear her voice. Food tastes better when it is attractive. The examples are endless. And aviators depend on vision absolutely! Even in IFR conditions you must *see* the instruments. In fact, the whole problem of spatial disorientation exists because aviators are so visually oriented. Consider this: On a bright sunny day with perfect visibility the brain receives *exactly* the same inner ear and proprioceptive inputs as it does on the blackest, foulest night! Why the disorientation? Essentially because of a lack of visual stimuli or "visual override."

It's easy to override the autopilot with a quick yank on the stick. This is manual override. A good example of *mental* override is a cigarette smoker. The first cigarette ever smoked universally causes violent coughing, scorched tongue, even nausea and vomiting. That cigarette is telling you something. But if you want to smoke, you override these signals to your brain.

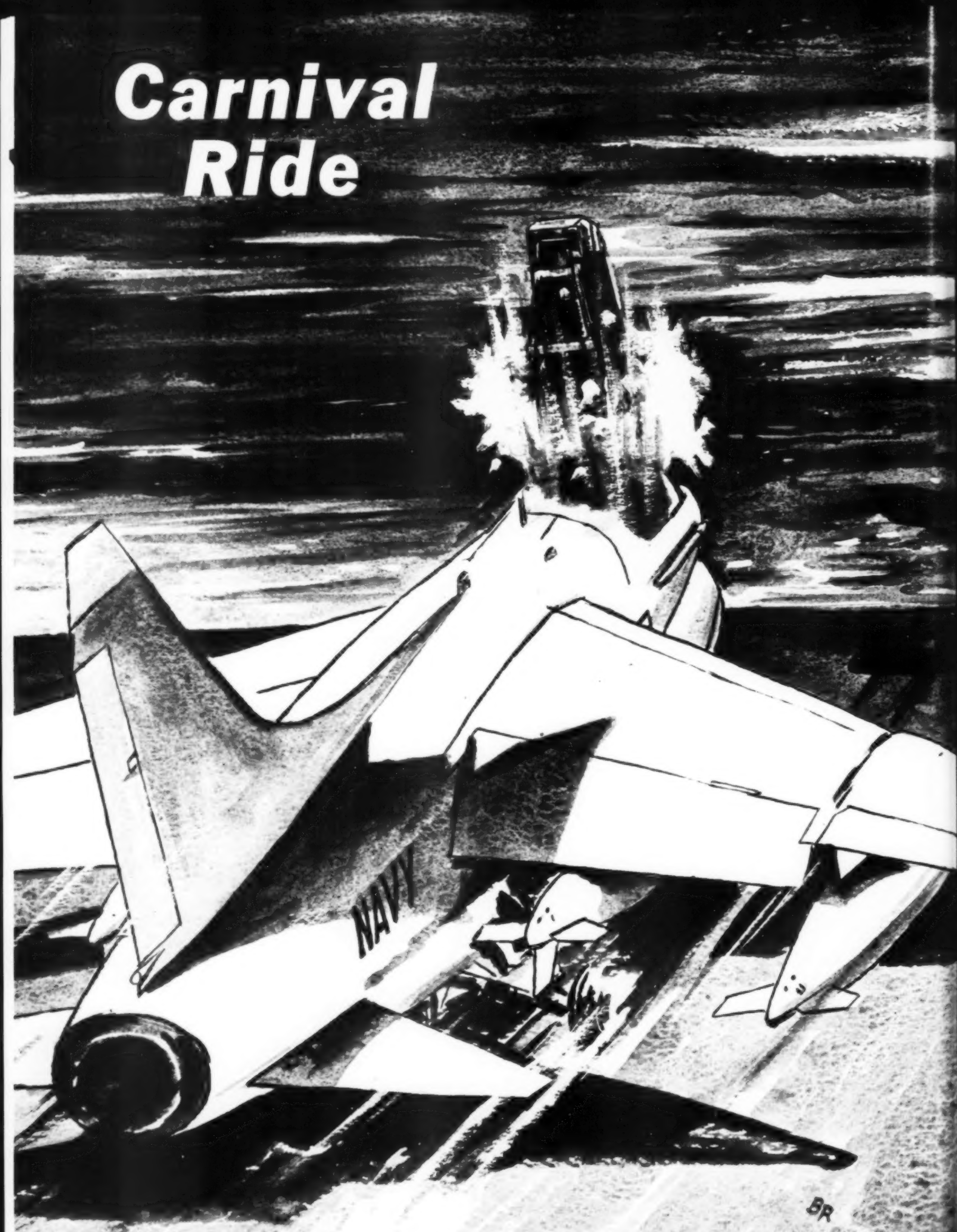
Our astronauts all require special training in a three-axis simulator to condition themselves, i.e. to develop mental override, for the illusory inputs of space flight. But perhaps the best and most appropriate example of override and, in particular, *visual override* is seen in ballet dancers and ice skaters who spin rapidly but never lose their balance. Extensive experimentation has shown that they all develop nystagmus when ending a spin but this is immediately arrested by the eyes as they fixate on an object . . . classic visual override of illusory inputs from other systems. This ability requires long training before the skaters become "habituated."

Similarly, the aviator must use visual override from either *outside and/or inside* the cockpit in all normal flight situations including night and IFR. (He should be "habituated.")

Moral of story: Don't depend on "out-of-cockpit" visual override. Train yourself to be equally adept at "in-cockpit" visual override.

Translation: *Use and believe your instruments!*

Carnival Ride



"A WILD carnival ride."

That's how an A-7 pilot describes his ejection as the aircraft went off the angle deck after engaging, then releasing the No. 2 wire.

Returning to the ship from a daytime combat mission, he led the four-plane formation into the break but had to wave off due to a fouled deck. On his second pass he arrested on the No. 2 wire and advanced power to MRT. As the *Corsair II* decelerated in its rollout he retarded the throttle to idle and raised the hook handle. Anticipating the end of the rollout, he began to advance the throttle and reached for the wingfold lever with his right hand. The aircraft lurched "almost like a rubber band snapping" he recalls.

"My first thought was that the arresting gear had parted so I reduced throttle to idle and clamped hard on both brakes, feeling that I had enough flight deck to stop the aircraft. The aircraft continued up the angle. I could hear someone yelling 'Brakes! Brakes!' on the UHF. *(This was the LSO. – Ed.)* I felt the brakes getting softer under my foot pressure and realized they were heating up so I engaged nosewheel steering in an attempt to steer the aircraft to the right, up toward the bow. But with both legs locked firmly out in front of me holding the brakes I never did get my pedal throw to turn the aircraft. As the aircraft approached the deck edge I still felt I would stop but then all I could see ahead of me was water and I knew I was going over the side.

"As my mind considered the question of which handle to pull, my hands moved and instinctively reached for the face curtain, grasped it and pulled firmly forward."

The pilot was not in the best position for ejection. Both his feet were firmly on the brakes with his legs straight out in front of him. His torso was pushed well back against the seat but his head was bent slightly forward as he looked at the water.

"First I saw darkness as the face curtain blotted out the bright sun, then I heard a loud bang and felt a jolt. From then on it was exactly like a wild carnival ride. I felt as if I somersaulted three or four times and was going in six different directions at once. I distinctly remember seeing the ship upside down, then the sea, the sky and the ship all whirling past me in a hectic but clear pattern."

He doesn't remember releasing the face curtain.

"I felt as if I was cartwheeling through space – my arms and legs flailing. As I felt the jolt of the ejection seat starting to move, I thought, 'I'll make it. This is the best seat in the fleet.' But I remember thinking after gyrating like a human cannonball, 'Well, this isn't right. I've only got 60 feet. Am I connected to the chute?'

"Just then the chute opened with what I would describe as a mild shock and I swung through the vertical, looking at the ship, feeling relief and searching frantically for my LPA-1 toggles. I found the left toggle but didn't pull it because I knew I should pull the right one first (or preferably, both simultaneously).

"My feet hit the water. Still no right toggle. So I pulled the left one.

"Water entry was mild. I went under only a foot or two at the most – the water stayed bright above me. I then found myself floating tilted to the right side with my feet up and my face in the water. Breathing was difficult and I realized I still had my oxygen mask on. I pushed the mask firmly against my face with my right hand and took two deep breaths of oxygen. Then holding my breath, I unhooked the mask from the left side and began the fight to keep my head above water. My attempts to get my feet vertically below me, which I felt would help keep my head above the swells, were frustratingly unsuccessful. This was partly because my left foot had become entangled in parachute shroudlines. My chute was floating on the surface beyond my boots.

"I remember thinking, 'I've *got* to get rid of the chute' and at the same time being thankful it was floating because my left foot was entangled."

The pilot describes his efforts to untangle himself as "pitiful."

"The large bulk of my survival vest was up under my arms and greatly restricted my reach. When I drew my feet up I could grasp the shroudlines but I could not reach far enough to loop them over my feet to free myself. During this effort I would go under water about every third swell. This complicated my problems drastically since each time I had to stop trying to untangle the shroudlines and fight to get my head back above water.

"It seemed to me as if all my buoyancy was up under my left arm and my feet. I was floating bent in a U-shape, my mouth and my shoelaces at water level. I terminated the untangling effort and set some priorities: *first,* release the chute and *second,* release the seat pan.

"With increasing panic I found that with my soggy flight gloves on I could not locate either the koch fittings or the rocket jet fittings. At this point the possibility of drowning seemed very real so I decided to try to relax and float by lying back and taking some slack out of the 'U' while awaiting the helo. This maneuver promptly submerged my head as my body rolled to the right. Now I was scared!

"I forced my head out of the water and saw the helo above me to my right. 'Oh, God,' I thought, 'please put someone down here to help me.' Immediately I felt a hand on my left shoulder – that's fast service! Crazy as it may sound under the circumstances, my first impulse was to shake the swimmer's hand and thank him. He told me to relax and inflate my LPA. Only then did I realize that I had never pulled that right toggle. I found it and pulled. This promptly cured my list and seemed to buoy my head up, too."

The pilot told the swimmer that his left foot was caught. The swimmer submerged and started working to free it. Feeling much better now, the pilot leaned back and meticulously pulled off his nomex flight gloves and threw them away. Then he reached down and unbuckled his seat pan on the first attempt. With his foot now freed, he found himself floating upright.

The swimmer released the pilot's koch fittings, untangled a shroudline from his right foot and pushed him away from the floating chute. The helo, dragging a horsecollar through the water, was now almost overhead. The pilot's helmet visor protected his eyes from the stinging spray. Remembering his deep water survival training, he turned his back to the spray and push-paddled toward the horsecollar. The swimmer got to the collar first and towed it to the pilot.

"In my eagerness to be saved," the pilot reports, "I attempted to get into the collar, thereby succeeding in entangling my legs in the wire hoisting cable. The swimmer shouted, 'No, no, use your D-ring.' Since he was doing a magnificent job of keeping me out of trouble I complied. Once hooked up, I grasped the fitting at the top of the collar, being especially sure not to put my hands on the wire itself. The only problem this presented was that my death grip prevented the swimmer from hooking up his own D-ring. Again his good judgment prevailed and I let go so he could attach himself to the hoist.

"We were then both hoisted aboard the helo and flown back to the CVA. Inside the helo the swimmer's attempts to have me lie still so he could undo my survival vest were nullified by my attempts to shake his hand and thank him. In retrospect I can only conclude that if the swimmer had not performed in such a cool, professionally outstanding manner, I probably would not be here writing this narrative."

The pilot had a number of recommendations on survival aspects of this accident:

- "On ejection make a conscious effort to hold your elbows and arms close to your body. This may prevent a flailing ride such as I had.
- "Prior to water entry or immediately thereafter, discard your oxygen mask completely. The mask definitely hindered my attempts to locate the right-hand koch fittings since it was hanging on my right shoulder.*
- "Get your flotation gear fully inflated first before attacking other problems. You work much more efficiently with your head above water.
- "Don't try to help the swimmer. You only get in his way. He's trained, competent and not nearly as 'shook up' as you are.
- "Take a hard look at the amount of gear you have in your survival vest to determine if you really need it and/or have to carry it there. Reducing the bulk of this gear, which is pushed up under your arms by the flotation bladders, will greatly improve your mobility in the water."

Future Developments

Two ideas are in the mill which may eventually eliminate water survival difficulties such as experienced by the pilot in this story. The first is the concept of automatic divestment of the parachute and automatic inflation of the life preserver. At the present time at least three devices which meet established criteria are being evaluated by NAVAIRSYSCOM. The second concept is the encapsulating liferaft. NAVAIRSYSCOM has bought six encapsulating liferafts which will allow an aircrewman to eject and enter the water in his raft without ever getting wet. Raft inflation time is three seconds. The present version of the encapsulating liferaft must be deployed manually but future deployment will probably be automatic.

*An AdHoc committee formed by CNO and NAVAIRSYSCOM has recommended that the oxygen mask be left on after low-altitude ejections to allow breathing in and under the water during situations such as encountered by this pilot. The feeling is that the ability to breathe under such circumstances far outweighs the encumbrance factor. This recommendation will be made at the next APSET (Aviation Personal and Survival Equipment Team) meeting and if approved will be forwarded to CNO for approval as a Navy Standard Procedure.

(A forthcoming issue of APPROACH will carry a feature articles on SAR helicopter crewman training. – Ed.)

There is sometimes a pretty slim margin between keeping your chin up and sticking your neck out.

Ace L.

APPROACH
takes pride in paying tribute to units and individuals who make particularly noteworthy contributions to READINESS THROUGH SAFETY in Naval and Marine Aviation.
The Naval Safety Center Salutes

Airborne Early Warning Squadron One

EIGHTEEN and a half years of accident-free flying – since the day of commissioning – is the proud record of VW-1, Airborne Early Warning Squadron One. During this time they have flown an average of 8333 hours per year in amassing over 150,000 accident-free hours.

VW-1 was commissioned at Barbers Point in June 1952 and remained there for five years until the home port was changed to NAS Agana, where it has been ever since. The squadron began operations with the PB-1W (Navy version of the B-17) and the VW-1 (Connie). In 1954 they received the WV-2 (EC-121K) and operated this series until 1968 when they shifted to the WC-121N. The primary mission of the squadron is weather reconnaissance in the Western Pacific. Their area of responsibility extends westward from the International Date Line (180th Meridian) to the Malay Peninsula and north from the Equator. Incidentally, that's an area of *many* million square miles of ocean. Their weather missions include low level, night penetrations of typhoons. (Now, there is something guaranteed to keep you awake.) That is not all either! The squadron also performs airborne early warning missions in SEAsia. They have a detachment at all times performing these services for the fleet while the rest of the squadron is keeping track of hundreds of storms in the WestPac theater. Other assignments have included weather reconnaissance of the best area for the recovery of Apollo 11 and also air control of the presidential helicopters carrying President Nixon from Johnson Island to the recovery zone. The squadron has participated in improving wave height predictions with laser instruments and is currently conducting atmospheric measurements of radio wave propagation. Along with these varied operational tasks VW-1 also operates as a RAG for other C-121 operators, which requires the highest standards in both ground school and flight training.

VW-1 has won many safety awards and unit citations during their illustrious operating period including COMNAVAIRPAC Quarterly Aviation Safety Awards, CNO Aviation Safety Award, CNO Special Merit Award for Naval Weather Service, Naval Weather Service Outstanding Unit Award and twice they have received the Meritorious Unit Commendation.

This proud squadron attributes its safety record to an awareness by all hands of safe practices at all times and insistence of professional performance on the part of pilots and leading maintenance petty officers. This has been evidenced by a strong safety organization, thorough training and excellent safety education programs. They have been blessed with a continuous flow of experienced C-121 operating and maintenance personnel who have passed along expert guidance and experience to younger pilots and maintenance newcomers to assure safe operations.

SURVIVAL is the name of the GAME!

By LTJG M. E. Liebman, USNR
HC-2, DET 66

EVERY time a new piece of survival gear for naval aviation personnel comes out two sounds rend the air – an agonized groan from aircrew members and a scream of ecstasy from the development people. Aircrew members say, "Not another thing to wear!" or "Does it really work?" The creators say, "Baby, this is *it* and there ain't nothing better!"

As "rescuers," we helicopter people are caught in the middle. Sometimes we have to pick up lost souls who are using new pieces of equipment along with whatever else they fancy it belongs no matter whether or not it was designed to be so mated. Naturally, we never find out just what the survivor has on until we hover over him and then sometimes it's improvise – improvise and pray.

Besides modifying techniques on the spot, one of our other problems is getting some "wonder devices" for our very own. Things being what they are, HC squadrons seem to get the last few mills of the aviator's equipment dollar. They are usually left to scrounge around for themselves. Fixed-wing friends tell us that helos never crash. (Besides, who then would come out and rescue us?) Helos don't fly into the water – they just whirl away into the sunset.

In spite of all cries of impending doom, HC-2 DET 66 set out to procure a complete set of LPA-1s and SV-2As for its personnel. Until we acquired all these niceties, we had been making do with very old mae wests and homemade versions of the SV-1.

One of the nice things to know in a rescue is how the gear actually works and what are the problems associated with its use. So, while AMERICA was in the Caribbean for a refresher training mini-cruise, two officers of DET 66 decided that it would be a good idea if they spent some time in the water with their new toys.

They were flown out and lowered into the water in a complete survival outfit with two minor exceptions. Instead of the regular aviation helmet they wore the flight deck protective shell and instead of flight boots they wore tennis shoes. Other than this, everything was as they normally fly, including nomex gloves.

Discussing the upcoming swim sessions, they decided that there would be two areas to explore. First, there was the actual swim phase with 1) the life preserver uninflated, 2) one side inflated and 3) both sides inflated. Secondly, they could then work with the new (to them) SV-2A vest and see what problems would be involved using the equipment contained in it.

The first thing one "survivor" learned was that he could barely keep his head above the water with the LPA-1 uninflated. The second thing he noticed was that with his gloves on he could not find the inflation toggles

for his vest. Looking down through the crystal clear water of the Caribbean did not help. In other words, when coming down in a parachute, take your gloves off and stuff them into a convenient pocket. On a dark night, it may be almost impossible to find and pull the lanyards. On the way down after the gloves have been shed it might be advisable to locate the toggles and pull both simultaneously or the right one first.

Some people feel that it might be advantageous not to inflate the LPA-1 before entering the water. While not inflating it may prevent hinderance in getting rid of the parachute and swimming away, the lack of immediate buoyancy appears of overriding concern.

If one side of the LPA-1 should not inflate, there are oral inflation tubes on the sides but they are very difficult to reach. In fact, it took one of the two "survivors" several tries even under ideal conditions. Once everything is inflated, however, the LPA-1 inspires confidence. After a short time one learns to lean back against the inflated headrest and enjoy the float.

The first order of business in the water, after making yourself as comfortable as possible, is to tell the world that you're out there and very lonely. For this, the pencil flare, next to the radio, is really topnotch. On a night rescue we spotted survivors 25 miles away when one shot a pencil flare. Two notes of caution: don't leave the pencil flare gun loaded and hold the gun and flare away from your face when you are firing.

O.K., suppose all nine pencil flare cartridges have been fired! What next? There is always your pistol. Getting it out of the vest is no problem and firing it is no sweat as long as it is in some semblance of normal condition. The main problems are 1) where to keep the spare rounds and 2) getting them into the pistol.

Point "1" is easily handled. The squadron aircrew survival equipment man can make a bandolier to carry extra ammo in the pockets of the vest as outlined in Aviation Survival Bulletin 157.

Point "2" which is reloading the pistol can be a bear, because it is very slippery when wet. If you are lucky and have one of the tiny five-shot Smith & Wesson .38s, things are not too bad. But if you have something bigger, try the following method: After the cylinder has been opened and the spent brass ejected, grab the pistol by the barrel and slip your thumb through the opening left by the cylinder. This will insure that the pistol will not rotate in your wet hand while you are playing cork. It even works with wet gloves.

Now suppose all your pencil flares are gone, your radio has died, all the .38 flare and tracer cartridges have been shot, and lo and behold, the helo cometh. How about your Mk-13 Mod 0 day/night flares? There are two of them in a side pouch on the LPA-1.

On the SV-2A vest there is a long tubular pocket on the right front side. It used to be for the battery of the older types of survival radios. However, with the advent of the PRC-63 and the PRC-90 you no longer have to carry a battery. The pocket is ideal for carrying another Mk-13 Mod 0 flare and you don't have to go digging for it. The flare is right there in front of you. For more than a year Mk-13 Mod 0 flares have come with a plastic protective cap to keep you from inadvertently snagging the ring. This cap stays on until you are ready to use the flare.

Every month or so you can read rescue articles in APPROACH about pilots who can't find specific items in their vests or who don't remember where they put the items or where to look. A cure for this malady has two steps.

- First and most important, collect all pilots and aircrewmembers in the ready room and have them dressed in complete flight gear. Turn out all the lights. Now that everybody is comfortably settled, have the survival officer call for a piece of gear. The name of the game is to find the article and take it out. Let's say the strobe light. When everybody has his strobe out, light them off. With the pencil flare gun, it is only necessary to take it out and barely screw in a cartridge. Now turn off the strobe light, or in the case of the pencil flare, disassemble it, and put it away in its proper place on the vest. No flashlights, please. It takes about an hour to go through all the items in the SV-2A.

- Step two involves a trip to the base pool with full flight gear except helmet and boots. Each man jumps off the diving board and swims around the deep end of the pool with his equipment uninflated. As a man becomes more familiar with the problems of remaining afloat, have him inflate his LPA-1. At some point during the floating exercise have him deflate one side of the preserver and inflate it orally. *(A dummy set of equipment kept by the squadron for this purpose is recommended here instead of actual ready-for-issue equipment. – Ed.)*

Now that everybody knows how the LPA-1 preserver works and what it can and cannot do, play the same game you played in the ready room. There is no need to rush to find the items because speed and efficiency will come with familiarity. However, make sure each man puts each article back into its proper place in the vest. This is a good introduction to the problems of working with the LPA-1/SV-2A combination.

One is surprised how much one learns about his equipment in these two simple exercises. You might even say it's frightening. ◄

Are YOU a G

By LCDR J. Meili

STOP . . . . as in hold position
PROCEED WITH CAUTION . . . . as in maintenance test flight
QUIET – HOSPITAL ZONE . . . . as in flathatting
SOFT SHOULDER . . . . as in narrow taxiway
CHAINS REQUIRED . . . . as in secured cargo

WATCH FOR TRUCKS . . . . as in runway repair
RIGHT OF WAY . . . . as in aircraft on final
DANGEROUS HILL . . . . as in steep approach
ROAD NARROWS . . . . as in GCA
PREPARE TO STOP . . . . as in check your brakes

VERTICAL CLEARANCE . . . . as in highest obstacle
ROAD BRANCHES . . . . as in airways check point
INTERSECTION . . . . as in Victor airways
SCHOOL CROSSING . . . . as in Pensacola complex
CONSTRUCTION AHEAD . . . . as in ramp repai

NO STOPPING . . . . as in prior permission require
PARALLEL PARKING . . . . as in line operat
ONE WAY . . . . as in low altitude engine fail
NO "U" TURN . . . . as in downwind tak
LOAD LIMIT . . . . as in Max Gross

NO LEFT TURN . . . . as in standar
NO PARKING . . . . as in expedit
RED LIGHT . . . . as in no not
GREEN LIGHT . . . as in
WRONG WAY . . . as i

NOV

Good Driver?

LCDR J. Meiling, USN

NARROW BRIDGE . . . . as in close 180
TOLL GATE AHEAD . . . . as in wheels-up waveoff
UNLICENSED DRIVER . . . . as in expired instrument card
DIM LIGHTS . . . . as in blind taxi director
SERVICES AHEAD . . . . as in destination plus 10%

STOP . . . . as in preflight with something missing
DANGEROUS CURVES . . . . as in airspeed versus altitude
SPEED LIMIT . . . . as in aircraft red line
RR CROSSING . . . . as in VFR civilian navigation
PEDESTRIAN CROSSING . . . . as in taxiway

SLIPPERY WHEN WET . . . . as in runway condition
MINIMUM SPEED . . . . as in final approach
VEHICLE INSPECTION . . . . as in preflight
STOP AHEAD . . . . as in low fuel state
TRACTORS PROHIBITED . . . . as in NC-5

WATCH FOR DEER . . . . as in mountain survival following ejection
YIELD . . . . as in VFR pattern
CAUTION . . . . as in propeller arc
EMERGENCY STOPPING ONLY . . . . as in farmer's field
FALLING ROCKS . . . . as in dead end canyon

NO "J" WALKING . . . . as in rotor disengagement
CATTLE CROSSING . . . . as in landing in Texas
SOUND HORN . . . . as in do you have me in sight
SHARP CURVE . . . . as in locked brake
DEAD END . . . . AS IN RAMP STRIKE

NOW THINK ABOUT IT, ARE YOU?

You Can Tell a Fighter Pilot, But

You can't tell him much. Especially if he thinks you are a little too quick to criticize him. The same thing is true of a patrol pilot, an attack pilot, a maintenance man or any other aviation type.

Since APPROACH is firmly in the business of trying to sell all these individuals on avoiding the mistakes of others by presenting the safety message, we (the staff) go to considerable effort to present material as fairly as possible. This means printing as many facts as possible in order to tell it like it is. But, dedicated as we are to presenting the facts, a need is recognized to extract some lesson learned, wherever possible, from the mishaps which come to our attention. This naturally leads to statements of opinion, including a lot of second-guessing of the unfortunate individuals involved in mishaps.

From time to time some readers take issue with some of the material presented. This is welcomed because we believe a free and open exchange of ideas and opinions is essential to the continuing improvement of naval aviation safety. Occasionally though a communication is received which causes more than average concern because it raises the issue of credibility. One recent letter stated, in part:

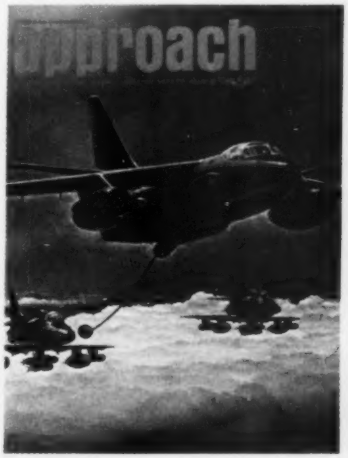
"I'm intrigued by the fact that after all the guidance and mandatory procedures we have provided to our pilots these days we still go to great extremes to point the finger at our intrepid aviator when something goes awry."

This statement was written with reference to an article in APPROACH. In this particular case we were wrong because responsibility for an incident had been incorrectly ascribed to the pilot. So we took our lumps – in print. After the pain had eased somewhat, it occurred to us that a discussion of safety education, as practiced in APPROACH and MECH, might be in order.

First of all, APPROACH and MECH are only two of many publications put out by the Naval Safety Center. Other publications include FATHOM, the Weekly Summary, Crossfeed, the Bioenvironmental Safety Newsletter, the U.S. Navy/Marine Corps Aviation Accident Statistical Summary and special publications pertaining to specific aircraft, engines and types of operations. These other publications are mentioned to illustrate the fact that the Naval Safety Center uses many avenues for spreading the word other than APPROACH and MECH. Nevertheless, most of these publications are classified and/or restricted in either content or distribution, and of all the Naval Safety Center publications, only APPROACH and MECH are general circulation aviation magazines intended to be read throughout naval aviation.

APPROACH is billed as the "Naval Aviation Safety Review" and for a number of years it was the only general circulation aviation publication put out by the Naval Safety Center. More recently, MECH has also been published. At first, MECH was an annual publication but for the last three years, it has been published quarterly.

APPROACH, in living up to its name as the "Naval Aviation Safety Review" has always published material covering the entire spectrum of naval aviation safety. It still continues to do so but the emphasis has changed, particularly since MECH became a quarterly three years ago. Since that time, much of the material concerning aviation support operations (aircraft maintenance, in particular) has been shifted to MECH. This has caused a gradual evolution in APPROACH material toward emphasis on the operational aspect of naval aviation safety. For these reasons, aircrewmen will find more material directly relating to their primary duties in APPROACH, while aviation support personnel will find more of such material in MECH. This statement is not intended to limit the readership of either magazine. It is considered that both aircrewmen and aviation support personnel have a bona fide professional interest in every aspect of naval aviation safety and that every man is a



potential reader of both magazines.

Many articles are printed as a matter of professional interest to readers. Not all of these articles have immediate, apparent application in the prevention of accidents but all of them are considered to be of potential benefit to safety over the long run. Even so, it is considered that we can benefit our readers most by providing them with the most readily useful information available, that is, information about known hazards to life and limb – especially those which can be avoided. Most of these hazards are brought to light by accident reports received at the Naval Safety Center so it is only natural that much of the material in APPROACH/MECH deals with aircraft accidents.

A review of statistics reveals that the following cause factors were involved in FY-70 accidents:

Pilot	40.6%
Other Personnel	8.7
Material Failure/Malfunction	35.3
Airbase facilities	0.9
Miscellaneous	0.7
Undetermined	13.8

Note: It is considered probable that many of the undetermined cause accidents were also due to material failures.

Does the material presented in APPROACH and MECH relate to these cause factors in the same proportion? Not exactly. In fact, a review of APPROACH and MECH will show that, except for the articles of general technical/professional interest, most of the material turns out to be a commentary on personnel factors of one sort or another. (Generally speaking, the aircrewman factors are discussed in APPROACH and the aviation support personnel factors are discussed in MECH.) At first glance this may seem like a one-sided state of affairs. Why, the reader may ask, does one find so much material concerning personnel factors and so little concerning material failures, comparatively speaking. Why aren't material failures written up in the same manner and to the same extent as personnel factors? The basic answer is that we believe we are being most effective when we can supply our readers with *usable* information. Most of the information available concerning personnel factors has the potential to be directly useful to our readers. The same cannot be said of information concerning material failures. This does not mean that the Naval Safety Center ignores material failures. As a matter of fact, identifying material failures and finding solutions to the problems posed thereby is one of the primary functions of the Naval Safety Center.

However, most material failures expose situations which merit more definite, official action (directive in nature) than the pages of APPROACH and MECH can afford. If a landing gear strut fails because of some defect in design or manufacture it would be utterly insufficient to report this in APPROACH/MECH in the *hope* that the problem would be noted by all the agencies and individuals involved and be corrected in a timely and coordinated manner. A problem such as this must be approached in a systematic and official manner which will *insure* maximum protection to personnel and equipment until the problem is resolved. Conceivably, this could involve the immediate grounding of all aircraft concerned, an order to the manufacturer to prepare an engineering change proposal, the allotment of funds to pay for the change, arrangements for the actual work, etc.

Note: The Naval Safety Center does not ground aircraft or direct retrofits. Rather, the role of the Naval Safety Center is to detect problems which pose threats

to safety and *recommend* timely corrective action to responsible commanders. Even so, it is obvious that these actions are beyond the scope of APPROACH and MECH.

This does not mean that APPROACH and MECH have nothing to say about material failures. Let's say a landing gear component fails because it has been weakened by corrosion. This is a problem which is susceptible to prevention by maintenance personnel through quality maintenance work on a day to day basis. This, too, would undoubtedly become the subject of official directives but in this case an article in either magazine could be instrumental in informing and motivating individual maintenance men to do a more careful and conscientious job in controlling corrosion. Conversely, little if anything could be accomplished by an article in APPROACH/MECH which reported, after the fact, that all aircraft of a certain type had been grounded for replacement of landing gear struts.

Not all problems can be neatly categorized as a material problem or a personnel problem. Some fall within a distinctly gray area, at least in the beginning. Take a hypothetical example of the unexplained inflight loss of canopies from a certain model aircraft. This could be caused by an unconscious action by the pilot, by improper rigging by maintenance personnel, by material failure of some component or by improper design. Such a problem may not be solved immediately because it may take some time to recognize the full extent of a problem and gather the facts. Between the time of the first occurrence and final corrective action, the same mishap may occur a second time. This, of course, will indicate a possible trend and will speed up and intensify the investigation into cause factors. The two occurrences may be related or they may be due to separate, unrelated and as yet, unidentified causes. In any case, the situation will be under active consideration by the

Naval Safety Center and by responsible commanders. A decision may or may not be made to ground all the aircraft of the same model upon the first, second, third, fourth or even the fifth such occurrence. It will depend upon the facts available, the potential hazard to aircrews and the mission of the aircraft. If the aircraft do continue to fly in the interim for good and sufficient reasons, the existing facts become a matter of interest and potential benefit to the pilots who fly these aircraft. In such a case, these facts would be passed to the operators by the responsible aviation commanders via the established channels of command. In addition, the subject most likely would be written up in one or more Naval Safety Center publications in order to insure the widest possible dissemination of this potentially valuable information.

Material failures which are *induced* by personnel can be *prevented* by personnel so these, too, are worthy subjects for discussion in APPROACH/MECH. But this takes us right back where we started – articles about personnel factors.

So we continue to print many more articles dealing with personnel factors than with material failures. Even so, we are not entirely happy with the situation. Occasionally, an idea presents itself on how to get a better handle on the material failure side of the picture. For example, one aviation commander pointed out that material failures could, in some cases, be detected before the fact by the process of NDT (non-destructive testing) techniques such as X-ray and ultrasonics. This is *usable* information so it is worth passing on via the pages of APPROACH/MECH. Along these same lines, it has long been recognized that engine life could be extended by judicious use of the throttle so as to minimize high power/temperature operations. This thought, too, is appropriate and valuable material because it is information which operators and maintainers can make good use of today, tomorrow and the next day. There are some other ways of presenting the material failure side of the accident prevention picture which can be (and have been) used for the benefit of our readers. Emphasis on performing a good preflight, for example, has more than once resulted in the detection of some incipient material failure before it could cause an accident. Nevertheless, when you put everything together that can be put into print about material failures which would be of substantial benefit to readers, it still amounts to considerably less than what can be said with potentially good effect about personnel factors.

Presenting new and useful articles about material failures continues to be a challenge to the Naval Safety Center. New insight into this problem

comes slowly but, obviously, there are many avenues yet to be explored. This is a problem which might well be taken up by you, the reader. Give this matter some thought. If you can come up with an idea on how material failure problems can be more effectively presented in APPROACH/MECH, we will be happy to increase the printing of articles on the subject.

One last comment on the material failure side of accidents is in order here. Specifically, we wish to dispel any notion that what appears in APPROACH and MECH is the extent of the Naval Safety Center's effort in this area. The fact is, the material failure situation might be likened to an iceberg. The visible part is what appears in APPROACH/MECH and the submerged part is that research that goes on daily within the Naval Safety Center, usually beyond the glare of publicity.

Every accident report, incident report and safety UR received at the Naval Safety Center is analyzed in detail. Every material failure reported receives the immediate and careful attention of an expert in the area concerned. Particular care is taken to insure that trends are detected at the earliest possible time. Whenever a problem is detected, action is expeditiously initiated. To achieve this, the Naval Safety Center maintains close liaison with manufacturers, suppliers and responsible naval activities. Speed is important and the vast majority of communications are by message and telephone. (This fact, alone, severely limits publications as channels of communication about material failures.)

Many details of these actions could be included here but suffice it to say that the Naval Safety Center is actively and continuously engaged in the prevention of material caused accidents – even if you don't often read about it.

One thing should be made clear here concerning

personnel factor accidents. The term "personnel factor" as applied to aircraft accidents is far from being an exact term. It is sufficiently broad that it can be applied to accidents ranging from those caused by some gross error in judgment to those caused by the mere failure to exercise the finest discrimination under the most trying of circumstances. An example of the latter is unconsciously allowing the nose of the aircraft to drop in close during a night carrier landing on a pitching deck. Therefore, the term "personnel factor" is not synonymous with the term "personnel error" as it is usually understood. The distinction may be a fine one but it is of sufficient importance that the Naval Safety Center officially discontinued the use of the term "pilot error" a number of years ago, although it still pops up from time to time. Thus, the degree of individual responsibility in a personnel factor accident may range from total responsibility to virtually none.

It is recognized that some personnel factor accidents are more easily preventable than others. For this reason, the problem is being actively attacked on two fronts: first, to educate and motivate personnel to the extent that they will be better equipped to meet the challenges which they face, and secondly, to lessen the demands being placed on personnel, particularly the pilot. The importance of the latter effort can be appreciated by comparing the shorebased accident rate with the carrier based accident rate. The carrier based rate per flight hour is more than twice that of the shorebased rate. Similarly, the rate for shorebased tactical flying operations can be shown to be higher than that for transport type flying. These disparities in the accident rates for different types of flight operations can best be explained by comparing the demands placed upon the pilots in the different operating environments.

The effort to reduce demands placed upon pilots takes many forms. Frequently, an accident will reveal the need to revise NATOPS or some other standard operating procedure in order to make the pilot's tasks easier. The ongoing development of CV landing aids is another example. These range from aids already in operational use to those still on the drawing board. These include ILS, ACLS, waveoff decision device, and improved carrier lighting, to name a few. Another area of considerable activity is aircraft design. Not enough thought was given to human factors during aircraft design until recent years. They are now receiving careful consideration, particularly in the design of new aircraft. In addition, design improvements are made in existing aircraft whenever the need becomes apparent and the changes are feasible.

Continued

The effort to lessen the pilot's load also includes considerable study on the effects of fatigue, the tempo of operations and other physical and psychological factors.

These developments are of interest to aviation personnel and are reported on and discussed from time to time in the pages of APPROACH/MECH. But, we consider that our readers can be served best by helping them attack the problem from the other side; by providing them with information which they can use right now, today and tomorrow. As already indicated, we are aware that not all personnel factor accidents can be eliminated by the process of safety education. Some of these will be eliminated only by changes in the design of equipment and improvement in the operating environment. These changes will take time but this should not discourage us from doing what we can now. We have it within our power to prevent many, if not most, of these accidents by effectively applying existing knowledge and experience.

No article is ever written for the sole purpose of showing that someone goofed. The test is that the account must provide information of real or potential benefit to readers in preventing accidents in the future. Typically, we present a basic *situation* developed from a study of one or more accidents, then proceed to comment on this situation in an effort to develop some *lesson* or *thought* which will be useful in preventing accidents. Some of these comments are so clear-cut as to be incontrovertible, e.g., "If the pilot had not pulled the canopy handle, he would not have lost his canopy when he did." Others are not as clear-cut. The comments may range from a discussion of pros and cons

to outright speculation. Just how far these comments go depends upon what we believe will be of value and benefit to our readers. But, whatever the comments, care is used to first state the basic situation correctly. We then feel free to proceed with the discussion and development of conclusions and make recommendations, always being careful not to pass off opinion as fact.

Invariably, the editorial staff has a lot of help in

developing conclusions and recommendations concerning the accidents and incidents which are discussed in APPROACH/MECH. As most readers are aware, every one of these accidents and incidents has been investigated to some extent. And practically all of the major accidents have been investigated in depth. First they are investigated by a board, usually convened by the command in which the accident occurred. This investigation is thorough and may take days or even weeks to complete. Every effort is made to gather all the facts, determine the reason for the accident and ways in which such an accident can be avoided in the future. The report is then thoroughly reviewed by appropriate commands in the chain of command. Finally, it is analyzed by fleet-experienced analysts at the Naval Safety Center. At every step in the proceedings, a vast array of facilities and technical specialists are available to investigators and reviewers.

These comments are not offered to suggest that the reader accept everything presented, even though it has had broad development. For one thing regardless of how many times an accident has been investigated or reviewed, we try not to lose sight of the fact that every one of these investigators and reviewers has had a lot more time (and help) in arriving at a determination of the proper course of action than did most of the individuals involved in the accidents.

Another question which comes up from time to time is why isn't more material printed relating the successes of aviation personnel? Anyone who has been around naval aviation for awhile knows that outstanding feats of airmanship are a daily occurrence. Likewise, the aviation support personnel who substantially contribute to aviation safety by their dedication and willingness to put forth that extra effort are legion. Why doesn't APPROACH/MECH print more of this type of material? First, except for the annual safety report, we seldom ever hear about the successes of a command, let alone individuals, unless a failure of some sort – either material or personnel – is involved. Secondly, it is the failures and not the successes which we must constantly guard against. Nevertheless, the successful handling of a difficult situation is considered to have a more positive safety message than does an accident report. We are, therefore, happy to present these stories when they come to our attention.

To sum up, we try to present information which is of the most immediate benefit to the majority of our readers – the operators and maintainers of the aircraft. For reasons we have already mentioned, this most often turns out to be reports and discussions of the personnel factor in aircraft accidents and incidents.

Our only goal is the prevention of accidents but we recognize we will be effective only insofar as we are able to command the interest and confidence of our readers. We, therefore, welcome a free and open exchange of ideas and opinion because, in the final analysis, accident prevention depends primarily upon what YOU believe and do. ◄

Knowledge is what you learn from others.
Wisdom is what you teach yourself.
You need both to live safely.

Old Mac

34

Flight Deck Accident

DURING launch, a yellow shirt was pulling aircraft on the starboard side of the fantail. As he got ready to pull an A-7 out of its spot for launching, he saw two blue shirts and a plane captain standing in front of a downed A-7, aft of the one to be moved. He motioned for the three men to clear the area.

The two blue shirts went forward and the plane captain went aft of the downed A-7 by the port mainmount for protection against the jet blast. As the yellow shirt pulled the A-7 to be launched out forward of the plane captain, the jet blast under the downed A-7 lifted the plane captain 10 feet off the deck and dropped him 50 feet away. He was seriously injured.

This avoidable mishap was the culmination of a chain of seemingly insignificant events, the investigating flight surgeon states:

- The plane captain remained with his downed aircraft longer than he needed to.
- The yellow shirt, after directing personnel away from the area, failed to check to see if all were out of danger before moving his aircraft.
- The plane captain failed to seek adequate cover after being directed to do so.

All flight deck personnel must maintain a *constant vigil* for hazards on the flight deck. Relaxation of strict observance of flight deck safety eventually leads to just such a mishap and proves just how dangerous the flight deck can be.

Home Accident Causes Burns of Throat

NEVER under any circumstances put any kind of toxic solution in a soft drink bottle for storage. Whenever a chemical is transferred from one container to another, the container must be clearly labelled.

Application of these elementary laws of safety would have saved an ATN3 a great deal of pain a few months ago. One evening he and a friend were using a solution of Drano in an experiment to make hydrogen gas for a balloon. On completion of the experiment they poured the solution into a 7-Up bottle and cleaned the original container. Later the ATN3's wife, not knowing what was in the bottle, put it in the refrigerator.

Three days later, the ATN3, assuming the solution was 7-Up, drank a few swallows before realizing what it was. He was rushed to the hospital for emergency treatment for burns of the mouth and throat.

Two safety lessons here. First, as we said above, never under any circumstances put any kind of toxic solution in a soft drink bottle for storage. Second, a product such as Drano is meant for a specific purpose and carries explicit directions from the manufacturer. Chemical cleaning products should not be used for purposes other than those for which they are designed.

Home accidents, like on-the-job accidents, are *preventable*.

Pass the word!

Sunlamp Burns

WHILE lying under a sunlamp aboard ship, an enlisted man received burns of the eyes from ultraviolet rays. As a result he has

'Giving up smoking is a snap. Haven't had a cigarette in 3 weeks, 4 days and 19 minutes.'

notes from your flight surgeon

Carbon Monoxide

THE aviation community is pretty much aware of the hazards of that odorless, tasteless, colorless killer, carbon monoxide. Especially in the colder months, CO can be a formidable hazard in the home as well. Each year CO kills approximately 1500 people in the United States alone. Many such deaths could be prevented if people were aware of CO hazards and corrected them.

Here are some good pointers on the subject of CO from the Public Health Service of the Department of Health, Education and Welfare:

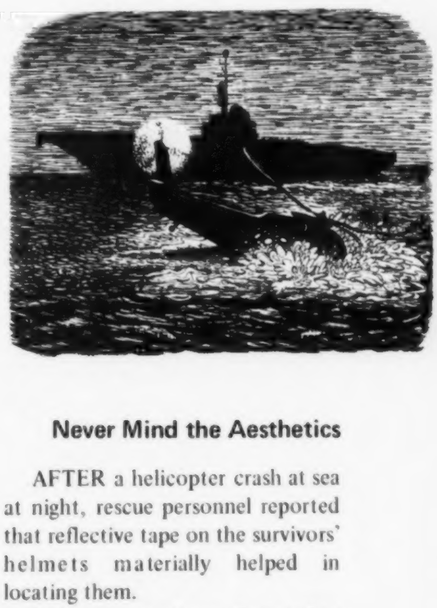
- CO is given off when fuels such as wood, coal, kerosene and gas are burned. All fuel burning heaters should be vented to the outside for elimination of this poisonous gas.
- Keep all stove pipes in good repair. Poorly fitted stove pipes will allow poisonous CO to escape into the home.
- An upright blue flame is safer in a gas burner than a flickering yellow flame. A flickering yellow flame indicates that the burner is out of adjustment. When this is the case, large amounts of CO are being given off.
- Burning charcoal produces large amounts of CO. Charcoal should never be burned indoors or in any enclosed area.
- CO is also produced by automobile and other combustion engines such as gasoline-powered mowers. Make sure the doors of any enclosure are open before starting gasoline-type engines inside.
- CO can leak into an automobile from a faulty exhaust system. Check your automobile muffler and tailpipe regularly for holes. Be sure your car windows are open when the car is standing still with the motor running.

CO is a deadly and silent killer. Persons exposed to CO experience headache, dizziness, nausea, vomiting and physical weakness. If you have experienced these common symptoms and think you have a faulty fuel burning appliance or other source of CO, call your local health department, gas company or appliance dealer. In extreme cases, the victim will become unconscious and death will result unless he is removed to a fresh air area. If the victim is not breathing, mouth-to-mouth resuscitation should be started immediately.

Be alert to the dangers of CO poisoning and take care. It could save your life!

lost some of his visual acuity and will have to wear glasses. This is a fairly widespread practice aboard ship – however, *sunlamps must not be used without some protection for your eyes.*

If you feel you must use a sunlamp, follow the manufacturers' guidelines and protect your eyes. Damaged vision cannot be repaired.



Never Mind the Aesthetics

AFTER a helicopter crash at sea at night, rescue personnel reported that reflective tape on the survivors' helmets materially helped in locating them.

"Aircrews, at times, forget that the reflective stripes and designs on their helmets are, in fact, survival devices," the investigating flight surgeon writes. "Aesthetics must not outweigh effective coverage in application of this reflective tape."

Aircrew Personal Protective Equipment Manual (NavAir 13-1-6.7) and BACSEB (BuWeps Aviation Clothing Survival Equipment Bulletin) 1-60 refer.

MANY years ago when the words *takeoff power* meant throttles to the firewall, it was not uncommon for seaplane pilots confronted with rough water and a stiff crosswind to get the power up part way and then after obtaining good control, holler to the copilot (there were no hot mikes) for takeoff power. All went well with this procedure until one night during a takeoff a seaplane commander requested takeoff power and his copilot reduced power instead of going to max power; after the plane commander shoved the throttles forward and again requested takeoff power the copilot *took off* power a second time. Unbelievable but true! The incident must have had a lot to do with discarding use of the term "takeoff power" to mean anything but take OFF power. Words are tricky and mean different things to different people. In moments of stress or emergencies and with high noise levels or garble, what seems plain enough to the speaker may not be received by someone else – let alone understood!

Other methods of communications, such as light signals, flags and hand signals, are also subject to even broader misinterpretation. Hand signals for instance, which play such an important part in the lives of

COMMUNICATE!

everyone in aviation, have been standardized and are generally understood when used correctly. However, use an odd-ball hand signal of any kind and it's almost a certainty that no one but the user will understand it.

An incident which nearly resulted in a fatality and did cause major injuries occurred to a flight crewman when he misunderstood hand signals. This is how it happened.

A Marine Huey (UH-1E) with a crew of four aboard (two pilots and two gunners) was out one day on an ordnance training flight. The mission was a routine guns and rockets hop with a combat veteran instructor pilot and a young silver-bar pilot under instruction in the cockpit. The flight proceeded normally from a thorough briefing of the entire crew concerning ordnance procedures and a thorough briefing between pilots concerning flight procedures. Upon reaching the shooting area, arming procedures, range clearance and several dry rocket runs were conducted before live runs were begun. The first live run using the right rocket pod was without problems. However, the next intended live run using the left pod resulted in no rocket firing. Cycling of the firing switches was made to no avail. So

the pilot landed and instructed one of the crew to check the left pod. A visual check was made and to all appearances everything looked normal. The aircraft took off to complete the mission. Several runs were made and again the right pod fired as advertised but the left pod continued to malfunction. The pilot was asked to land once more so the other crewman could check the left pod. After landing all cockpit switches were safetied. The crewman removed the cannon plug from the left pod but did not insert the detent pin. Next the crewman removed the intervalometer for inspection. This crewman then saw the other gunner make a hand signal which he interpreted as a crisscross meaning switch intervalometers from right to left. This he proceeded to do. Meanwhile the gunner outside the aircraft moved to within view of the instructor pilot where he gave the same hand signal. The pilot did not understand and shook his head. Meanwhile the other crewman began to install the right intervalometer in the left pod but was having difficulty and positioned himself behind the left pod, and as he inserted the part a rocket fired. He was thrown to the ground by the blast and as seen in the photographs his clothing was ripped open and burned. He was placed aboard the helicopter, the rocket pods were jettisoned and the pilot proceeded directly to a nearby naval hospital and delivered his patient. The crewman was lucky! He is expected to fully recover.

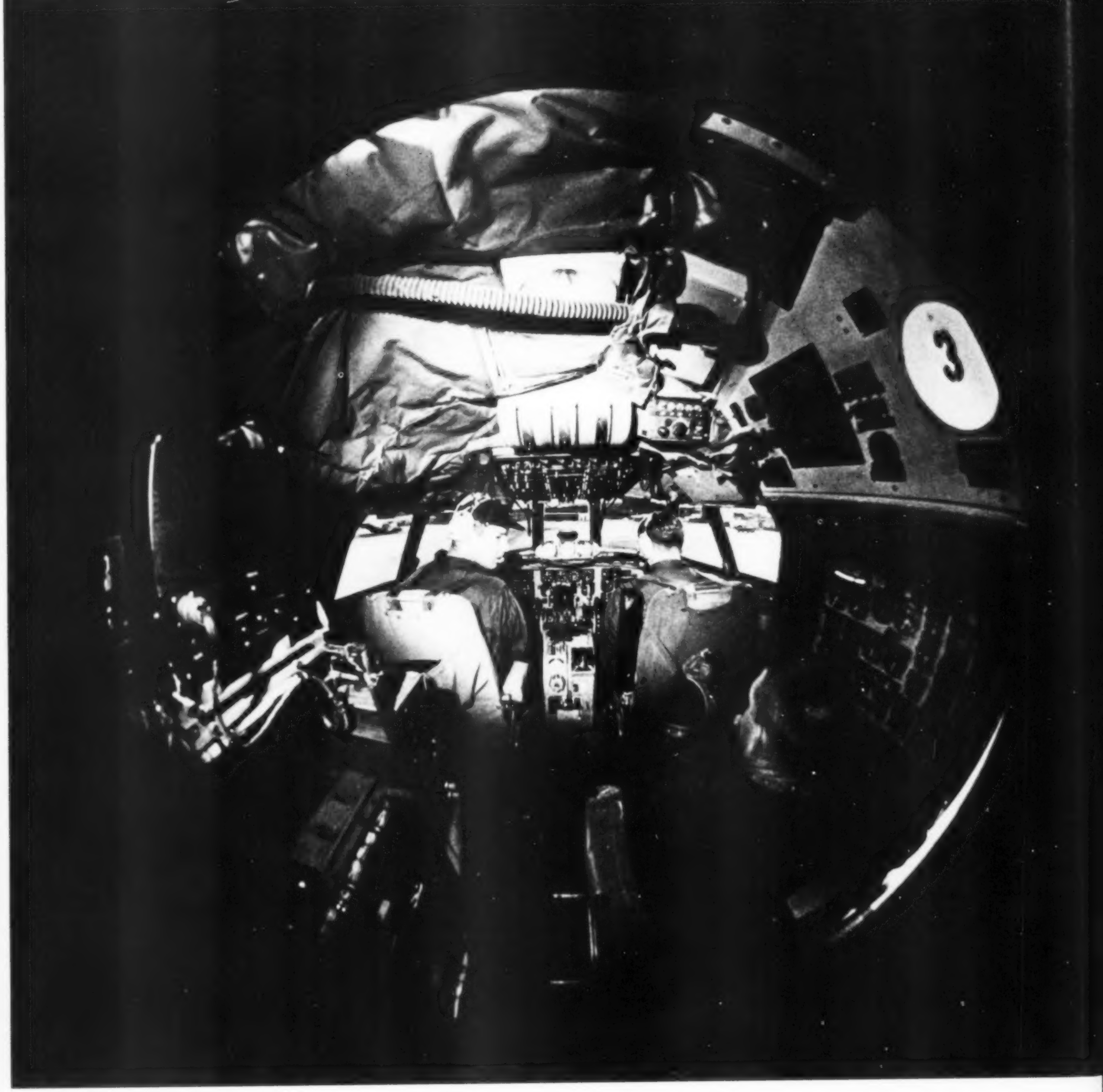
The breakdown in communications was the primary reason for this mishap. If the gunner had ascertained the crewman understood his signal, or if the gunner had cleared the intended action of the crewman with the pilot before the fact, or if the gunner had told the crewman to desist after seeing the pilot shake his head – of course the chain of events which resulted in the injury would not have occurred. One said his signal *meant* one thing; the other *thought* the signal meant something else. This is human fallability. Other examples of this, or just plain saying the wrong thing but meaning something else, are included in the following one-liners from accident reports:

- The flight crewman said, "No. 1 is on fire" when he meant No. 2.
- GCA student final controller said, "You are left of centerline" when he meant centerline is to your left.
- The pilot said, "Feather No. 2" but the copilot feathered No. 1, the good engine.
- It is conceivable that a ground accident which resulted in a fatality would not have occurred if the safety observer's signal to *lower flaps* had not been misinterpreted to mean *close bomb-bay doors*.

Whenever you speak, signal or write to convey a thought or action it is important that the one requesting a response knows that the other thoroughly understands what is required. The one receiving the request or order must be certain before he acts that there is no doubt what is intended. The use of standard phrases and standard hand signals spelled out in NWIPS has been established for the very purpose of eliminating any doubt or confusion in interpretation. Be safe, gents, use them!

These photos show the results of rocket exhausts burns and tears.

What Is



Pilot Proficiency?

"OH NO, not another article about pilot proficiency," you say. "Haven't we heard enough on that subject." In one way you're right. Over the years thousands of words have been written in APPROACH by an assortment of writers concerning pilot proficiency. Therefore, it would seem that the subject has been well covered. However, right now today there are many naval aviators with varying degrees of flight experience who fail to grasp the meaning of the word proficiency. Let's forget Webster, Funk and Wagnall and the rest of the dictionaries, for their definitions of proficiency are broad in scope. What we're interested in conveying to the readers of this article is what proficiency means as it applies to naval aviators.

Prior to preparing this article a number of AARs were examined which involved all types of flights and aircraft. It was surprising to find that the AAB and/or endorsers in the chain of command found a lack of pilot proficiency to be a primary or contributing cause factor in a sizeable percentage of these accidents. This percentage may not be completely accurate when measured against all mishaps which have occurred during the past few years, but it certainly indicates that a reappraisal of pilot proficiency is warranted at this time.

What is pilot proficiency? Is it simply meeting the annual flight time requirements? Accumulating enough flight time in the preceding months to be considered safe for flight? Being able to pass the NATOPS written exams and standardization checkride? Not on *your life* it isn't. Sure, all of these requirements have to be met before a pilot can sign for an aircraft, but they alone do not make a pilot *completely* proficient. To attain the necessary level of proficiency a pilot must also:

- Be physically and mentally fit for every flight.
- Know his aircraft so thoroughly that he will react promptly and accurately to any emergency which might arise.
- Program his flight time so that it is accumulated uniformly vice in long flights with great intervals of time between each flight.
- In the case of an operational pilot; be able to fully perform the mission assigned to his unit.
- Use every hour in the air to maximum training advantage. This can only be achieved by complete ground training preparation in advance of each flight or training cycle.

Pilots flying different aircraft and missions will have different proficiency level requirements. For instance, a CRT (combat readiness training) pilot will not have to reach the same level of proficiency as that required of a carrier pilot. In other words each pilot must attain the maximum level of proficiency for his aircraft and mission.

Much has been written about the responsibility of aviation unit commanders to ensure that their pilots are thoroughly trained both on the ground and in the air. They readily accept this responsibility for they are highly professional and experienced aviators. They would be the first to cast a critical eye upon themselves if an accident involving pilot factor occurred in their unit, and then attempt to determine how they might have prevented it from happening. Sometimes they must share in the blame because there was a laxity in the

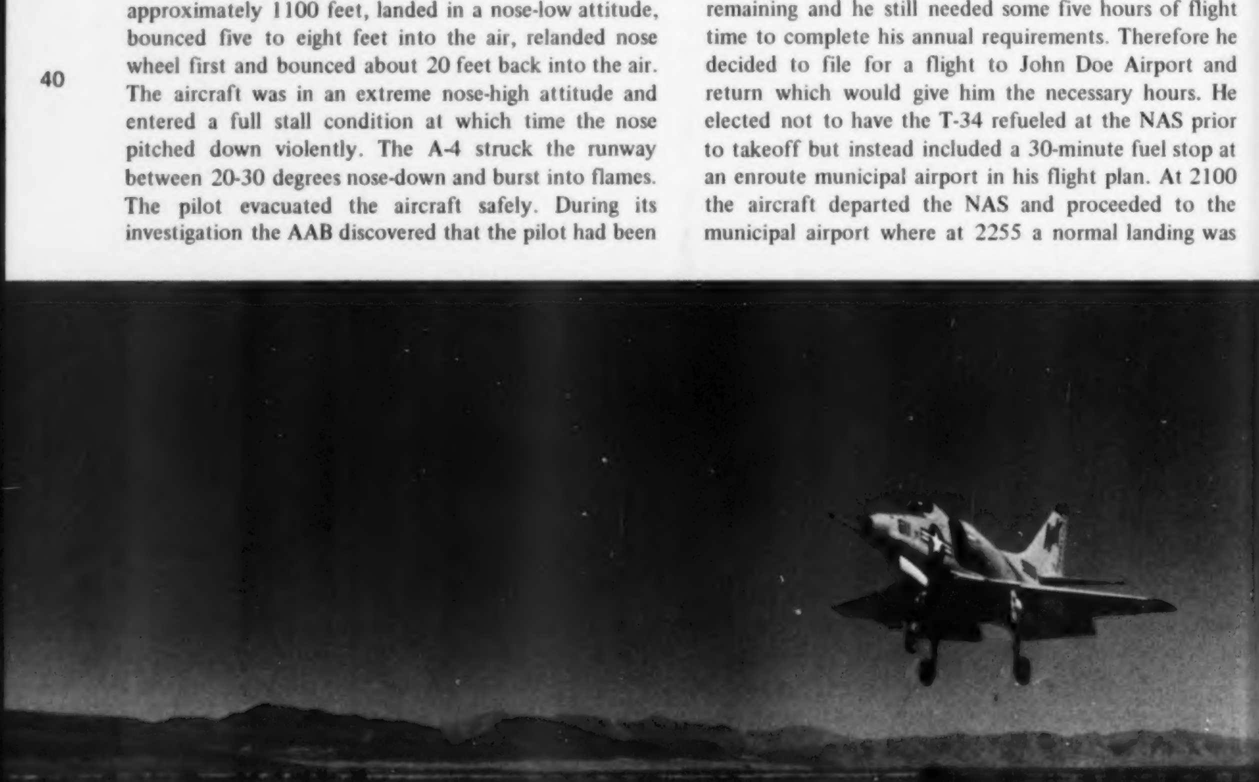
training program or not enough attention was paid to the marginal flight ability of the erring pilot. However, all too often the ground and flight training program was strong and vigorously conducted, yet a pilot busted up an aircraft because he failed to adhere to the proper procedures. That is why it's the pilot's primary responsibility to ensure that he absorbs the material presented through the ground and flight training syllabi. When a pilot, no matter what his experience level, does not consider himself proficient in the performance of certain aerial maneuvers or in the proper use of certain equipment, he should bring it to the attention of his superiors. It is not degrading to do so. In fact it is indicative of a pilot's maturity.

Cited below are excerpts from several accident briefs which involve a lack of pilot proficiency. They are presented with the hope that other naval aviators will learn from them and as a result not fall heir to the same pitfalls.

- Upon returning to NAS Eastern after a carqual evolution the pilot of an A-4 made a normal landing approach until touchdown. At that time the nose came up abruptly and the aircraft became airborne to a height of about 20 feet. It continued down the runway for approximately 1100 feet, landed in a nose-low attitude, bounced five to eight feet into the air, relanded nose wheel first and bounced about 20 feet back into the air. The aircraft was in an extreme nose-high attitude and entered a full stall condition at which time the nose pitched down violently. The A-4 struck the runway between 20-30 degrees nose-down and burst into flames. The pilot evacuated the aircraft safely. During its investigation the AAB discovered that the pilot had been having problems with normal field landings mainly because he had a tendency to be complacent about them. His performance in the field carrier landing pattern and at the carrier was average, however, his instructors commented in his jacket that he made several normal field approaches/landings with excessive airspeed. The Board concluded that the primary cause factor of the accident was the pilot in that he used poor judgment and incorrect landing technique by not aborting the landing after the first porpoise. It recommended that instructors and commands continue to be very critical of pilots' performance in the landing pattern, insisting that they fly the prescribed NATOPS pattern. The C.O. in his endorsement went one step further by stating, "The critical evaluation of pilots extends to all phases of flight and cannot be limited to landings alone."

Several squadron personnel knew this pilot had a tendency to fly fast during normal field approaches and landings, yet no one took action to correct it. He was not proficient in this phase of flying.

- At about 2000 local time the pilot of a T-34B completed a 1.3 hour NATOPS check with himself as the evaluee. There was but one day of the fiscal year remaining and he still needed some five hours of flight time to complete his annual requirements. Therefore he decided to file for a flight to John Doe Airport and return which would give him the necessary hours. He elected not to have the T-34 refueled at the NAS prior to takeoff but instead included a 30-minute fuel stop at an enroute municipal airport in his flight plan. At 2100 the aircraft departed the NAS and proceeded to the municipal airport where at 2255 a normal landing was



The pilot's physiological condition contributed to the accident.

made. Upon shutdown the pilot discovered that the fuel service crew had secured. Attempts to contact these personnel through night service telephone numbers were unsuccessful. The pilot then contacted flight service and asked if fuel was available anywhere in the vicinity. They advised him that all fuel service was secured. While the pilot was talking with flight service the manager of a civilian airport located five miles from the municipal airport came up on the line via a telephone patch. He told the pilot that he could provide fuel and then described his field as a sod, unlighted airport with reflectors located down the sides of the runway. He further stated that if the pilot wished to use his field the runway would be 23 and that he would position an automobile at the end of the runway to illuminate the reflectors and show landing direction. The pilot decided to accept the offer and asked flight service for a one hour extension of his flight plan, which was granted. After takeoff the pilot headed the aircraft for the sod airport. He failed to see the field as he passed over it but sensing that he had overflown it he orbited to the south in an attempt to locate it. Meanwhile the airport manager saw him orbiting, manned his single engine aircraft and took off to lead him back to the pattern.

The *Mentor* pilot saw the other aircraft airborne with his landing lights on and proceeded northward to follow it through the pattern to a landing. The two aircraft did not have radio contact directly or by relay during this period, nor was the possibility of one aircraft leading the other into the pattern discussed during the telephone conversation. The civilian aircraft landed and the T-34 followed and made a low pass over the field to check it. Finding it satisfactory the pilot turned downwind and commenced his approach to a landing. Meanwhile after landing near the center of the 200 foot strip the civilian aircraft turned left and taxied up the extreme left side of the runway. He positioned the nose of the aircraft directly towards the approach end of RW 23 and had the aircraft navigation lights, anti-collision lights and starboard landing light turned on. The *Mentor* pilot continued his approach and seeing nothing on the runway entered final. His aircraft was lined up on the extreme left side of the runway and he landed 10 feet

inside the runway boundary. Almost immediately he noticed the other aircraft and used right brake and rudder to swerve to the right in an attempt to avoid a collision. Unfortunately, the attempt was futile and the left wing of the T-34 impacted the left wing of the civilian aircraft causing substantial damage to both aircraft. The pilots departed their respective aircraft without injury. The Board came to the following conclusions concerning this mishap.

(1) The primary cause factor in this mishap was pilot error in judgment, initially when he failed to have the aircraft refueled prior to the cross-country flight, again when he failed to properly plan the flight and finally when he decided to land at an unattended civilian airport at night.

(2) Poor pilot technique was exhibited by a landing within 10 feet of the left hand edge of a 200-foot wide runway and was a contributing factor to the accident.

(3) The pilot's physiological condition contributed to the accident. As noted in the medical officer's report, a visual acuity deficiency, physical and mental fatigue, improper diet, and excessive smoking were present at the time of the accident. The existing visual acuity deficiency was doubtlessly accentuated by the other physiological factors and, coupled with the concentration of attention necessary to land the aircraft, accounted for the pilot's failure to see a lighted aircraft on the runway. These same physiological factors undoubtedly influenced the judgment errors which preceded the accident.

(4) The airfield utilized by the pilot was inadequately equipped for night operations. An unlighted runway, marked only by reflectors which were illuminated by automobile headlights is not considered an adequate facility for the operation of a naval aircraft on a pilot proficiency flight. Additionally, the absence of a taxiway necessitated landing aircraft to utilize the active runway as a taxiway leading to the hangar area.

(5) Although the pilot had received verbal authority from the airport manager, the landing was not for official business nor was prior approval obtained from the operational commander as required by current directives.

The series of judgment errors leading up to this mishap are certainly not to be expected at the experience level of this pilot. Causes for these decisions may be found in the purpose of this flight which was solely to fulfill annual minimum flight time requirements. The very short time remaining in the fiscal year was a crucial factor. The pilot had allowed himself to be backed into a corner with no easy way out. Consequently he made decisions which he knew to be counter to good judgment in order to complete the flight.

• An F-8 commenced takeoff from an NAS to perform a local training flight. The engine runup, afterburner ignition and brake release appeared normal with the aircraft accelerating as usual. Approximately 400 feet short of the M-21 arresting gear the aircraft was rotated to a nose high attitude and the tail cone was observed to lightly contact the runway with both main wheels still rolling. Shortly thereafter the nose was lowered and the tail cone ceased skagging. After passing the M-21 gear, and at about 2500 feet from the point of brake release, the nose of the aircraft was rotated sharply upward and the tail cone again contacted the runway and was observed to be trailing sparks until the *Crusader* became airborne at an abnormally high angle-of-attack. Observers stated that they had a plan view of the aircraft at this time and that it appeared to be flying in an uncontrolled condition and was wallowing from left to right, still nose high. As the aircraft rolled to the left and the nose pitched over, the canopy was seen to leave the F-8 followed almost immediately by the ejection seat. The aircraft crashed and was destroyed. The pilot's chute failed to blossom because the aircraft was out of the ejection envelope and he received fatal injuries. Several pilot factors were brought to light during the AAB's investigation:

(1) Prior to leaving the maintenance office the pilot quizzed several individuals as to whether they had witnessed his last takeoff and commented that he would "stand the aircraft on its tail."

(2) The pilot attempted to get the aircraft airborne far short of the distance required in accordance with current takeoff data. He also employed an extreme nose high attitude.

(3) The pilot failed to secure his hardhat, attach his oxygen mask or turn on the cockpit oxygen.

(4) The improper setting of various cockpit switches (as an example the fuel transfer switch was in the OFF position) indicated that the NATOPS takeoff checklist was not properly used, if at all.

(5) The pilot had not flown for almost four weeks and had only accumulated 18 hours in the preceding three months.

As a result of the accident investigation and analysis the AAB arrived at the following conclusions:

(1) The aircraft's control surfaces, powerplant and ejection seat all functioned as designed.

(2) The pilot executed an abnormal takeoff and overrotated into a stall condition.

(3) The pilot violated NATOPS by not wearing his oxygen mask on takeoff and not performing the complete NATOPS takeoff checklist.

(4) The extremely complacent attitude of the pilot both before and during his short flight was not in

keeping with the professionalism required of a naval aviator.

There is little more that can be added to this tragic mishap except to emphasize that because of his complacent attitude this pilot lacked proficiency in every sense of the word.

The mishaps and improper use of equipment presented are but a few of the many which have occurred as the result of a lack of pilot proficiency. Unless corrective action is taken now there will be more of them in the future. Sit down, naval aviators, and take a good look at yourselves. Are you thoroughly proficient in carrying out every facet of your duties as a pilot? Aviation unit commanders, take a good look at the pilots working for you. Have they all reached the level of proficiency required to carry out the mission assigned to them? If the answer to either of these questions is "no," then remedial action is necessary. What this will entail can only be answered by you and will not be attempted here.

In all fairness it should be emphasized that the great, great majority of naval aviators are thoroughly proficient. When an emergency arises they know the proper actions to take and they take them. Their names don't appear in the headlines because, like the news, rarely do the good things get printed or broadcast. But the people who work with them and fly with them know who they are and hold them in high esteem. These are the PROs and because of it they will take the bull by the horns and do everything in their power to bring the weak pilots up to their level of competency. If personnel error is ever to be eliminated from AARs, then a reevaluation of pilot proficiency seems like a fine way to get it started.

There is no substitute for good headwork and certainly all the proficiency in the world will never replace it. However, the lack of proficiency sure can back the unwary aviator into extending himself to the point where he is making gross errors in judgment.

Every accident is a notice that something is wrong with men, methods or material.

Flip Changes

VFR Low Altitude High Speed Routes: Effective 1 April 1971 procedures for operating on the DOD VFR Low Altitude High Speed Training Routes will be changed. These procedures are already in use within the FAA Southern Region (South East United States). Suggest that all pilots who plan to operate on Low Altitude Routes after 1 April 1971 refer to the textual data preceding the FAA Southern Region route descriptions in Section IIA, FLIP Planning. This information, which currently describes procedures for the FAA Southern Region, will be applicable to all DOD VFR Low Altitude High Speed Training Routes after 1 April 1971.

LETTERS

One machine can do the work of 50 ordinary men. No machine can do the work of one extraordinary man.

Elbert Hubbard

"To All Pilots and NFOs"

NAS Meridian – In the August 1970 APPROACH an item appeared entitled "To All Pilots and NFOs" (page 33). It tells of the necessity for careful preflight of the ditching handle which I agree with fully. Then it goes on to say, "If after ejection, you separate from the seat manually by pulling the ditching handle for any reasons, you must manually actuate your parachute in order for it to deploy." This is not true of the TALCO seat made by North American for the T-2A/B/C aircraft. If you eject and obtain manual seat-man separation, it is *not* necessary to manually deploy your parachute – it will deploy automatically.

I am an instructor in NAMTRADET 1004 at Meridian, Miss., for the survival and environmental systems of the T-2A/B/C aircraft. The above-mentioned article raised a lot of questions on our ejection seat.

Anthony P. Lageose
AMS-1

• You are quite right. The different characteristics of the ejection seat in the T-2A/B/C (and the A-5 and OV-10) were overlooked in generalizing on the subject of manual seat separation and manual parachute actuation. As we said, the particular aircraft NATOPS Manual and NATOPS Pocket Check Lists are the "Bibles" for the specifics. Sounds as if you folks in Meridian are on your toes!

Use of Strobe Light

Camp Pendleton, Calif. – It seems that several commercial aviation publications are constantly covering the merits of a strobe light vice the present rotating beacon type anti-collision light. Personally, it seems this type anti-collision light is much more effective, particularly here in the high density Los Angeles/San Diego area. Is this device under any type of development study? If so, how far has the study progressed at this point?

CAPT John V. Hogan, USMC
HML-267

• The possible use of strobe lights on Navy aircraft is now under consideration by NAVAIRSYSCOM. This subject will be reported on more fully in a future issue of APPROACH.

Flight Deck Helmet Light

Fig. 1

Fig. 2

FPO, San Francisco – The standard flight deck safety helmet modification shown in Fig. 1 and Fig. 2 was designed by CWO2 J. A. Joyner of this command. The modification consists of sewing a short piece of one-half inch nylon tape to the center section of the helmet and clipping a standard Navy distress signaling light (FSN 6230-892-5192) to it. Additionally, string is attached from the light to the helmet. A recent improvement to the modification is to make the piece of nylon tape which is sewn to the helmet long enough to wrap around the light and put snaps on the end. This will hold it more snugly.

A number of flight deck troubleshooters have tried out the modification on the carrier and have found it does not interfere with normal duties. We feel this modification is easier and better than trying to attach a light to the flight deck mae west and it still provides the flight deck worker with an absolutely essential piece of survival gear should he find himself in the water at night. Also, it is in a position where it is useable without having to be moved or held.

LT M. P. Christiansen, USN
ASO, VS-38

• We think you have a good idea here. The Safety Center is forwarding your material with a favorable endorsement to

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

A VA-27 pilot reads "Safety/UR Message Summary."

Passing the Word Via Safety/UR Message Summary

LT C. W. Griffin, VA-27 ASO, has informed us of a novel and effective way of passing the word on important safety matters within VA-27. He writes:

"A copy of all safety URs (Unsatisfactory Reports) received by VA-27 is placed in our 'Safety/UR Message Summary' binder (see photo). These messages are grouped according to the aircraft system to which they relate (engine, hydraulics, electrical, etc.). URs concerning survival gear (LPA-1, strobe lights, flare guns, etc.) are listed under survival equipment. The messages are placed in each category according to date/time group. The Message Summary is checked at least weekly for new items by all squadron pilots. Messages of an immediate nature are discussed in daily all officers meetings. We feel the Message Summary is a handy readyroom reference that acquaints pilots with system failures or circumstances that have occurred in the A-7 community and starts them thinking about what they would do in a similar situation. (Note: When the address page contains no pertinent information we discard it, printing the originators name and date/time group on page 2. This keeps the binder from getting too bulky.)"

This appears to be an excellent way to get important safety information to those who can use it. Good show!

the flight and hangar deck clothing desk at Naval Air Systems Command.

Arm Pocket Cover

FPO, San Francisco – As safety officer of an A-4 *Skyhawk* squadron, I am very concerned with engine FOD originating from the pilot himself. Our squadron has designed the arm pocket cover as shown in Fig. 1 and Fig. 2. The cover is held down by velcro tape and allows stowage of all necessary writing implements used by the modern attack pilot. Maybe this "we-found-a-way" suggestion will benefit other squadrons in their FOD control programs.

LT David E. Oliver, USN
ASO, VA-94

• We understand some other squadrons have come up with similar ideas in the past but yours looks very neat indeed! We pass it along here (and also in Personal/Survival Equipment Crossfeed) as an example of the kind of positive thinking which contributes to aviation safety.


Fig. 1


Fig. 2

Continued

"Honest Assessment" II

Dallas, Texas – I found the Aircraft Accident Board recommendations in the area of ejection and survival on page 12 of the September 1970 issue ("Honest Assessment") most interesting. Having been in the water involuntarily on one occasion myself, I emphatically agree with all five of the recommendations. More specifically, I found the recommendation concerning some type of oxygen mask fitting which does not require use of fingers for release to be the most interesting of all. I have one on my hard hat! I have had one since 1959! It was standard in the Navy for several years before it was replaced by the improved APH-6 Hardman fitting.

I refer, of course, to the Sierra bayonet fitting that was initially standard on the APH-5. When the APH-6 came out I tried it for a while but couldn't latch or unlatch my mask with gloves on. I went back to my trusty APH-5. When the spacer fix came out for the APH-6 fittings I tried that, too – better results than before but still it required a functionally operating thumb and forefinger on each hand. Back to my APH-5. I have replaced the lining and the earphones several times but the shell is still unblemished and I can get my mask on evenly and comfortably and I can remove it with a swipe of my forearm. I have *never* had it come loose inadvertently and I have run the full gamut of VF operations including four years as C.O. (the guy everyone likes to step on). If it ever does come off I know that I can replace it quickly without a lot of fumbling.

I heard a rumor several years back that the reason the Sierra bayonet fitting was replaced was because of the possibility of losing your mask during an underwater ejection. If this is correct I respectfully suggest that the Safety Center compare the number of successful underwater ejections that required oxygen from the mask with the number of people who may have been lost due to suffocation and also those who have reported difficulty with mask removal after ejection.

Based on my personal experience I will continue to use my Sierra fittings unless ordered, or otherwise convinced that there is a superior fitting to be had.

CDR Frank A. Liberato, USNR-R
Vought Aeronautics Division
LTV Aerospace Corporation

● The Sierra bayonet fitting was not discarded because of the possibility of losing your mask during an underwater ejection but because it could be lost in any ejection. As we noted in our answer to a similar letter in December, a new Sierra bayonet oxygen mask fitting may be on the way to general Navy use, depending on the evaluation results.

Eyes Like "Iggles"!

Fort Benning, Ga. – APPROACH continues to be *tops* as an aviation safety publication. Congratulations on the material and method of presentation. Certainly, most of these are of great interest to the majority of personnel in military aviation who have access to APPROACH.

But alas! Someone has really slipped, when an airfield photo as *old* as the one used on page 22 of September 1970 issue, which draws attention to the article "CAUTION: Wet Runway Ahead!" is used in your fine publication. That photo of Saufley Field NAS, Pensacola, Florida may have been made as early as 1944 but hardly later than 1956. Those double runway centerline and runway length markings have long since disappeared from airfields. It would be interesting to know how such an old photo escaped the usual eagle eyes of the editorial personnel. An article dealing with such recently developed data as portrayed in the article, certainly deserves a photo of an up-to-date runway, which is marked in accordance with the current standard.

J. V. Warren, Jr.

● We must admit, sir, that *you* are the possessor of the eagle eye! We were so caught up in getting out the word that the antiquated picture slipped right by. Thanks for the good words, however, and we'll watch our photos more closely.

Shroud Cutter Knife

FPO, San Francisco – A pilot recently received a severe gash below his right thumb when the blade of his MC-1 shroud cutter accidentally opened, penetrated the pocket material of his SV-2 survival vest and cut him when he zipped the vest up. Numerous pilots have reported finding the blade partially open in the pocket but no injuries had occurred locally prior to this incident.

Pending redesign of the knife, the squadron pilots now further secure the blade by wrapping a short length of electrician's tape or a rubber band around the knife near the blade tip. This has no effect on its primary mission since the knife is carried in its pocket with the shroud cutter blade open.

LT J. C. McColly, USN
ASO, VAL-4

● You will be interested to learn that the Navy is no longer procuring the MC-1 shroud cutter and that new procurement will be the fixed-blade shroud cutter used by the USAF. This should eliminate the problem entirely. However, procurement of the fixed-blade shroud cutter has just commenced so it may be some time before it shows up in the supply system.

Why Boots?

FPO, New York – While on a recent deployment the crew of an SH-3D was vectored to an accompanying DD for a personnel transfer. There were two men and some baggage to hoist. The crewman talked the pilot over the fantail which was pitching considerably and the usual number of tourists had to be chased away. The sling was lowered and the first man brought up routinely.

The second man was moved to the pickup spot and the crew, seeing a splint on his right arm, decided to exchange the sling for a Boyd seat to minimize any strain. In order to assist the ship's crew the helicopter's first crewman was lowered to the DD. A short delay ensued while the deck crew found a short piece of line to secure the man to the seat. A quick release hitch was used and the transferee was hoisted with no problems.

The Boyd seat was once again exchanged for the sling and was lowered to the helo crewman to be picked up. At this time the DD sent up another casualty – this time a man with a broken ankle. He was sent up as the helo's crewman and two sharp DD crewmen guided him clear. Once more the sling was sent back down for the helo's crewman. As the slack in the cable was taken up the deck of the DD washed out and the crewman arced out over the fantail in about a 20-degree swing noting the stern light and glareshield as he swung out over the water. He knew on the return arc he would contact these obstacles so he turned himself to face them and raised his feet to fend off as he swung back. His feet broke the light globe and bent the glareshield on impact. However, the crewman had NO injuries, just a good gouge nearly the full length

of one of his *properly laced safety boots.*

Once again the proper use of flight gear proves a point.

HS-11 Safetymouse

● How true!

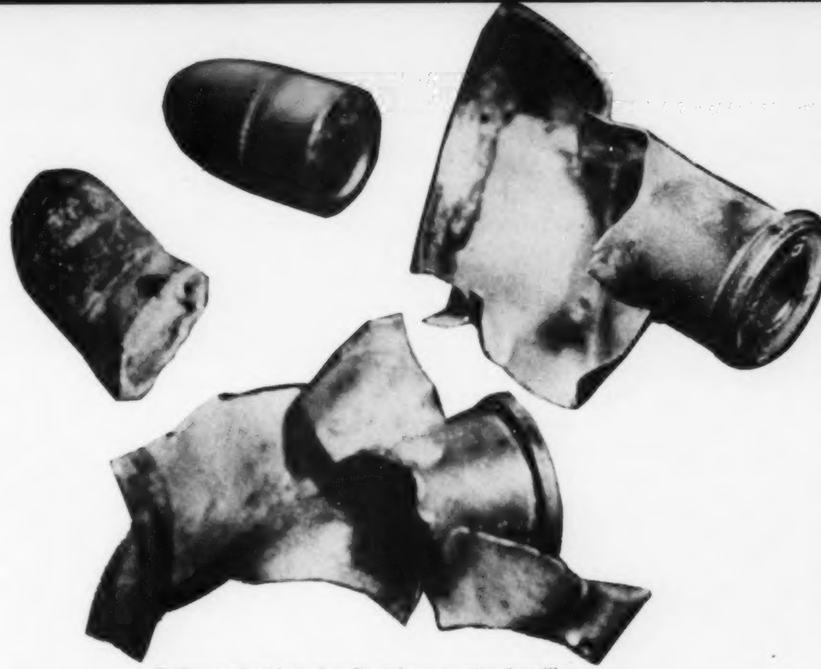
SH-3D Saved

Mobile, Ala. – Having just put down your November issue, I can't resist the impulse to offer two observations. The first is in reference to the article, "SH-3D Saved." It seems to me that unchallenged, the article's emphasis on succcessful inflight troubleshooting runs the risk of being counter-productive where safety is concerned. Once an emergency is comfortably under control, mission permitting, it is generally best to leave well enough alone until on the ground (or deck) where technicians can experiment without fear of compounding the problem.

Secondly, this entire issue was very well written and packed with valuable eyecatching information. APPROACH, traditionally outstanding, seems to get better and better. I congratulate you.

CDR R. J. Copin, USCG
USCG Aviation Training Center

● Very few people would care to argue your first point. In general, covering the whole spectrum of emergencies, you are absolutely right. The best way to troubleshoot is to leave it to the maintenance sleuths after you're safely on the deck. Your kind words on the magazine are deeply appreciated.



Bullets and casings that fired from careless handling.

Accidental Bangs

US Naval Station Midway Island – A transiting Marine pilot was being carried to his aircraft in the back of a pickup truck. When he reached his aircraft, he tossed his flight gear, including his bullet vest, to the ramp. As his bullet vest struck the concrete ramp, "Bang, Pow!" two .38 caliber bullets exploded – one tracer and one standard round. His bullet vest was shattered. Luckily no one was hurt, although numerous line personnel were around. It was noted that the primer of one shell remained intact while the other blew out from the base of the shell. Both the tracer and copper-colored bullet remained close to where the shells exploded.

Brass fragments from the shells could easily have injured someone if it had not been for the vest which covered the explosions. The remaining 15 bullets on the vest were turned over to the station armory where they were all test fired normally.

As a rabbit hunter from boyhood, I have always handled live ammo as carefully as eggs. It's amazing how some grown men sling their guns and bullet belts around, e.g. banging them against ready room bulkheads, allowing them to fall on steel decks – and in this case the ramp.

We were lucky this time, but will someone else be as lucky next time – perhaps in a crowded ready room?

LT G. M. Starnes, USN
Aircraft Maintenance Officer

● We agree with everything you have said. You have pointed out one more aspect of safety that needs attention. Too often it takes a fatality to drive home a lesson in safety. In this case it was fortunate that no one was injured. Perhaps others will be forewarned by your effort in taking the time to point out this potential hazard.

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RADM W. N. Leonard
Commander, Naval Safety Center

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

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Credits

This month's cover painting by staff artist Blake Rader depicts one of the more tedious and exacting moments of combat operations. **Pg 8** Photo: NASA. **Pg 9-10** APPROACH diagrams by Don Lips. **Pg 27** Art (left) by R. G. Smith, Courtesy MacDonnell-Douglas. **Pg 31** Photos (extreme right) and **Pg 39** Art Schoeni.

U.S. NAVAL SAFETY CENTER

Come See Me!

By CDR Charles H. Zilch

I AM a Navy weatherman and sometimes I make mistakes but I am never completely wrong. My job is more accurately described as that of an environmental scientist, subspecializing in meterology and oceanography. What can I do for you? Save your life, on occasion, that's all! But only if you take the time to talk to me.

Weather conditions vary considerably during winter and there is the increased possibility that you will encounter severe weather. So get the jump on winter weather by planning ahead. One of the best ways to plan ahead is to thoroughly study the weather before takeoff. This study will be a great deal less painful if you stop by and enlist the assistance of your friendly weatherman. It may surprise you to know that I sometimes spend up to two hours getting ready to give you a 5-10 minute preflight weather briefing but I don't mind because that's my job. And when you have additional questions about winter hazards such as icing, snow showers, crosswinds and visibility and their effect on your aircraft and your intended flight, I'll be glad to take the time to help you study the situation and come up with the answers *before* takeoff.

I can help you, but *only* if you take the time to stop by and talk to me. So come see me!

Your Navy Weatherman

Diagnosis:

FIXATION

Prognosis:

YOUR LAST GOOD HIT!

For the latest on the subject of target fixation check out "Pressing the Attack can be Hazardous," beginning of page 1.